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THE JOURNAL
OF THE
ROYAL ANTHROPOLOGICAL INSTITUTE
OF
16810
GREAT BRITAIN AND IRELAND.



VOL. XLIV.

512.35
512.35
PUBLISHED BY THE
Royal Anthropological Institute of Great Britain and Ireland,
50, GREAT RUSSELL STREET, LONDON, W.C.

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NOTICE.

For convenience of reference, all volumes of the new (imperial octavo) series which began in 1898 are numbered in continuation of the old demy octavo series Vols. I-XXVII. Thus Vol. I of the imperial octavo series=Vol. XXVIII of the old series; and the present Vol. XLIV corresponds to N.S. Vol. XVII.

The Index to the present volume includes an index to the Institute's monthly publication MAN for the year of issue 1914.

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JOURNAL
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OF GREAT BRITAIN AND IRELAND.

MINUTES OF THE ANNUAL GENERAL MEETING,

JANUARY 20TH, 1914.

Professor A. KEITH, *President, in the Chair.*

The Minutes of the last Annual General Meeting were read and carried.

The CHAIRMAN appointed Messrs. A. L. LEWIS and H. S. KINGSFORD as scrutineers, and declared the ballot open.

The SECRETARY read the report of Council for 1913, which, on the motion of the CHAIRMAN, was carried unanimously.

The TREASURER read his Report for 1913, which, on the motion of the CHAIRMAN, was unanimously accepted.

It was proposed, seconded, and carried unanimously that Messrs. JACKSON, PIXLEY and Co. be and hereby are appointed Honorary Auditors to the Institute for the year 1914.

The PRESIDENT then delivered an address on "The Reconstruction of Fossil Human Skulls."

Professor THANE proposed a vote of thanks to the PRESIDENT for his valuable and interesting address and requested him, in the name of the Institute, to allow his address to be printed in the *Journal*, with the illustrations.

Professor WATERSTON seconded the vote, which was carried, by unanimous acclaim.

The SCRUTINEERS then handed in their report, and the following were declared to be duly elected as Officers and Council for 1914-15.

President.—A. Keith, Esq., M.A., LL.D., F.R.S.

Vice-Presidents.

T. A. Joyce, Esq., M.A.
Sir R. B. Martin, Bart., M.A.

Professor G. Elliot Smith, M.A., M.D.,
F.R.S.

Hon. Secretary.—T. C. Hodson, Esq.

Hon. Treasurer.—R. W. Williamson, Esq., M.Sc.

Council.

H. J. Braunholtz, Esq., B.A.
Major R. L. Cummins, R.A.M.C.
D. E. Derry, Esq., M.B., Ch.B.
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H. J. Forbes, Esq., LL.D.
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W. H. R. Rivers, Esq., M.A., M.D.,
F.R.S.
Professor C. G. Seligmann, M.D.
W. W. Skeat, Esq., M.A.
Sir Everard im Thurn, K.C.M.G., C.B.
H. W. Marett-Tims, Esq., M.D.
Lieut.-Col. L. A. Waddell, C.B., C.I.E.,
LL.D.
S. Hazzledine Warren, Esq., F.G.S.

The Institute then adjourned.

ANNUAL REPORT FOR 1913.

The Council is glad to report that the total membership of the Institute now reaches the record figure of 534. On January 1st, 1913, the number of subscribing members was 357. Between January 1st, 1913, and December 31st, 1913, there were 22 losses by death and resignation, and 58 new members were elected. Of the new Fellows 26 were elected in November and December, and their membership must be reckoned as from January 1st, 1914. The net number of subscribing Fellows for the year 1913 was therefore 367. The numerical gains and losses are expressed in the appended table:—

	Total Jan. 1st, 1913.	Loss by death or resignation.	Since elected.	Jan. 1st, 1914.
Honorary Fellows	44	—	—	44
Corresponding Fellows... ..	1	—	—	1
Local Correspondents	36 ¹	— 12	+ 8	32 ¹
Affiliated Societies	3	—	—	3
Affiliated Members	3	— 3	—	0
Ordinary Fellows:—				
Compounding... ..	71	— 1	+ 1	71
Subscribing	357	— 22	+ 58	393
Total (ordinary)	428	— 23	+ 59	464
Total Membership	508	— 38	+ 67	537

¹ Of these 7 are also Ordinary Fellows.

The Institute has suffered the following losses through death, viz., Lord Avebury, R. Bruce Foote, Dr. A. H. Hamilton, R. H. Pye, J. H. W. Sheane, and Dr. A. Russell Wallace, O.M.

Lord Avebury, who was one of our oldest Fellows, joined the Ethnological Society in 1863, was the first President of the Institute, the first Huxley Memorial Lecturer, and was intimately acquainted with the Institute's work during the earlier years of its existence. An obituary notice appeared in *Man*, 1913, 56.

Dr. A. H. Hamilton had been a local correspondent for many years and at the time of his death was Director of the Colonial Museum at Wellington, New Zealand, where his work was of a very high order.

By the death of Mr. R. H. Pye the Institute has suffered a severe loss. He had been a Fellow for upwards of twenty years and during that time had served for many years on the Council and Executive Committee, having been Chairman of the latter body since 1905. Besides these services he acted as Auditor of the Institute's

accounts for several years, a duty which he performed most capably and willingly. The Council desire to express their gratitude for the many services that he rendered the Institute.

Dr. A. R. Wallace, though pre-eminently a biologist, was deeply interested in Anthropology. His contributions to the Theory of Natural Selection will always take a place second to Darwin's "Origin of Species" and his eminent services to science were recognised by his being granted a Pension on the Civil List and more recently by his being one of the earliest recipients of the Order of Merit.

MEETINGS.

During the year 1913, 12 ordinary meetings were held, at which 15 papers were read : 7 dealing with archæological, 1 with physical, and 7 with ethnographical subjects. Thirteen exhibitions of specimens were made. The Council is pleased to state that arrangements have been made for the meetings to be held at the rooms of the Medical Society of London in Chandos Street, Cavendish Square, the first meeting having taken place there on December 16th.

HUXLEY MEMORIAL MEDAL.

Professor W. J. Sollas was the recipient of the Huxley Memorial Medal for 1913. The title of his lecture, which was delivered on November 14th, was "Paviland Cave."

PUBLICATIONS.

During the year two half-yearly parts of the *Journal* have been published, viz., Vol. XLII, Part 2, and Vol. XLIII, Part 1. Of the former 124 and of the latter 128 copies have been sold, the combined sales exceeding by 7 the record established last year.

The usual 12 monthly parts of *Man* have been issued, the number of pages of two of these parts being increased from 16 to 24 pages. The sales show an improvement on the figures of last year, which is a matter for congratulation.

LIBRARY.

The number of accessions to the Library amounts to 520. The exchange list has been augmented by one Colonial and one Foreign publication. It is expected that the new catalogue will be printed next year.

INTERNAL.

The revision of the Articles of Association has occupied the attention of the Council during the current year and the result of its labours will be submitted to Special General Meetings to be summoned early in 1914. The Council desires to express its cordial appreciation of the very valuable assistance rendered by the Treasurer in drafting the amendments to the Articles.

EXTERNAL.

The proposed publication of monographs on the tribes of Burma afforded to Council an occasion for approaching the Government of Burma with suggestions as to the lines on which these monographs should be composed. The Council is happy to state that the Government of Burma has cordially accepted its advice and co-operation, and it is confidently anticipated that important additions will be made to our knowledge of the ethnography of a singularly interesting region.

The Council has also been in communication with the Indian Government with regard to the organisation and development of anthropological work in India, and has every hope that in the near future practical effect will be given by the Government of India to their recommendations.

The Council has appointed a committee to co-operate with the committee appointed by the British Association at its Birmingham meeting in 1913 for the advancement of the scheme proposed by Sir Richard Temple, Bart., C.I.E., for the extension and improvement of the teaching of applied anthropology at the universities of the United Kingdom. A conference will be held in February next to discuss this important subject, when Earl Selborne has consented to preside.

The Council desires to call attention to the weighty pronouncement in the report of the Royal Commission on University Education in London as to the importance of anthropological training for all who propose to spend their lives amid the non-European races of the Empire.

The establishment of an Anthropological Club in the University of London is a healthy sign of progress. The Institute looks to the universities in particular for the material of the future and it is gratifying to find that many of the students who take the Oxford Diploma in Anthropology join the Institute, to which and to Anthropology their training should enable them to render important service.

DOMESTIC.

Among the tasks to which the new Council will find it necessary to devote attention is the re-drafting of the By-laws of the Institute with a view, in particular, of bringing them into closer harmony with the Articles of Association. The preliminaries have been already considered. The slow development of the membership of the Institute renders it necessary to postpone important measures for the appointment of Local Correspondents of the Institute in accordance with a definite scheme for the collection of scientific information.

The deficiencies of the Library are many and great. The Institute has not—but certainly ought to have—at its disposal funds to enable it to assist in the publication of works of scientific value, the market for which is necessarily restricted. It is not yet possible to abolish the special subscription for *Man*, and it is a matter of great regret that there are serious arrears in certain cases in

payment of this due. Lack of means hampers the Institute in every direction. Projects for developments involving expenditure have been informally considered, but have always to be laid aside for this reason. Until the Institute possesses a habitation worthy of its name, it will remain deprived of much of the authority which the importance and magnitude of its activities deserve, and until it is in possession of adequate resources, it cannot do for Anthropology what obviously lies to hand in the organisation and collation of the stores of material which have been accumulated and are being augmented daily.

TREASURER'S REPORT FOR THE YEAR 1913.

The accounts for 1913 disclose a remarkable increase in the amount received from subscriptions, the total of which is £143 in excess of the average of 1911 and 1912.

This great difference is partly accounted for by the considerable amount of past arrears collected in 1913; by the fact that a life subscription was received (which was not the case in 1912); by the reduction in the amount of the current year's arrears, as compared with 1912; and by the unusual number of subscriptions paid in advance (this being largely due to the number of new members elected in November and December, whose subscriptions are credited to the following year).

Setting aside these causes of inflation, however, and turning to the figure of current subscriptions, which is, perhaps, a truer basis of comparison, and deducting from that figure the sum of £10, the diminution in the amount of the current year's arrears at the end of 1913, as compared with that of 1912, we find that the amount received in 1913 was £60 in excess of the average of the two previous years. This comparison, however, is not *absolutely* correct, as I do not know, and so have not been able to take into account, the amount of the current year's arrears at the end of 1911.

The publication of the *Journal* has been an exceptionally heavy tax upon the year's resources, the cost of production having been £229 in excess of the proceeds of sales.

The cost of publishing *Man* has been £26 more than in 1912; but it was well below that of 1910 and 1911, and may, I think, be regarded as fairly normal. On the other hand the proceeds of sales show a margin of £21, which is about the same as that of 1912, and nearly covers the cost of postage.

A special feature of the capital account is the remarkable extent to which I have had to write up the value of our books, publications and stock, as the result of a re-valuation by Mr. Francis Edwards.

The Metropolitan stock had been written down by me last year under the belief that it was the 3½ per cent. preference stock of the Metropolitan Railway. A subsequent inspection of the scrip, which had been deposited by the Trustees at the Bank, showed that it was the Metropolitan Consolidated 3½ per cent. stock of

London; so I have written it up again to the value, as on December 31st last, of that stock.

The gross revenue for 1913 has been £1,376, which figure exceeds that of 1912 (which did not have the benefit of a life subscription) by £120.

The expenditure, on the other hand, including Library purchases, etc., but excluding special publication expenses, charged to capital account, has been only £1,305, which figure may be compared with £1,192, the amount of the normal items of expenditure in 1912.

The surplus on revenue account has therefore been £71, about £7 more than that of 1912.

ROBERT W. WILLIAMSON, *Hon. Treasurer.*

ROYAL ANTHROPOLOGICAL INSTITUTE

ACCOUNTS FOR

REVENUE

RECEIPTS.		£	s.	d.	£	s.	d.
BALANCE in hand, 1st January, 1913					150	15	7
SUBSCRIPTIONS :—							
Current		733	7	0			
Arrears		54	12	0			
Advance		79	10	9			
Life		31	10	0			
		<hr/>			898	19	9
SALE OF "JOURNAL"					213	16	4
SALE OF "MAN"					193	3	0
SALE OF "HUXLEY" LECTURE					5	14	11
ADVERTISING					4	12	6
DIVIDENDS					49	10	7
INCOME TAX RECOVERED (3 years)					8	12	2
SUNDRIES					2	0	0½

£1,527 4 10½

LIBRARY

BALANCE (overpaid), 31st December, 1913	£	s.	d.
	18	4	0
	<hr/>		
	£18	4	0
	<hr/>		

OF GREAT BRITAIN AND IRELAND.

THE YEAR 1913.

ACCOUNT.

	PAYMENTS.	£	s.	d.	£	s.	d.
RENT		225	0	0			
Less rent received		1	6	0			
					223	14	0
"JOURNAL"					442	18	6
"MAN"					172	16	10
SALARIES					159	14	11
HOUSEKEEPING,					32	8	1
ADVERTISING					18	14	8
LEGAL EXPENSES.....						9	11
STAMPS AND PARCELS					87	2	6½
TELEPHONE AND TELEGRAMS.....					8	17	8½
PRINTING AND STATIONERY					57	16	0
COAL, GAS, AND ELECTRIC LIGHT					12	7	11
LANTERN					5	12	7
INSURANCE					6	4	3
TRAVELLING					2	12	5½
HUXLEY MEDAL AND LECTURE (7 medals cast)					11	13	6
DIRECTORY SUBSCRIPTIONS					2	10	7
HAKLUYT SOCIETY SUBSCRIPTION					1	11	6
BRITISH ASSOCIATION SUBSCRIPTION (Mr. Martindell)					1	0	0
POST OFFICE (for abbreviated address)					1	1	0
PURCHASE OF FURNITURE (glass cupboard and book trays)					11	3	0
REPAIRING TYPEWRITER.....					2	8	8
LIBRARY VALUATION					5	5	0
LINE BLOCKS (tattoo marks).....					4	17	0
LIBRARY CATALOGUE (typing slips for)		12	15	8			
Less subscription received towards Catalogue		1	1	0			
					11	14	8
SIR E. RAY LANKESTER'S LECTURE (expense of)					2	14	0
SUNDRIES					7	6	0½
Balance in hand, 31st December, 1913					232	9	6½
					<u>£1,527</u>	<u>4</u>	<u>10½</u>

ACCOUNT.

	£	s.	d.
BALANCE (overpaid) 1st January, 1913	7	1	0
BOOKS AND BINDING	11	3	0
	<u>£18</u>	<u>4</u>	<u>0</u>

CAPITAL ACCOUNT.

	£	s.	d.	£	s.	d.
BALANCE BROUGHT FORWARD 1ST JANUARY, 1913				2,146	2	0
INCREASE IN VALUATION OF LIBRARY, STOCK, AND FURNITURE:						
Books, Publications, and Stock (valued by Mr. Francis Edwards at)	3,493	6	0			
Furniture, etc. (estimated at)	200	0	0			
	3,693	6	0			
Estimated 31st December, 1912, at	885	0	0	2,808	6	0
INCREASE IN VALUE OF £300 METROPOLITAN CONSOLIDATED 3½ PER CENT. STOCK:						
Now worth, at 95½.....	286	10	0			
Valued 31st December, 1912, at.....	258	0	0	28	10	0
				£4,982	18	0
DIMINUTION IN VALUE OF £886 BURMA RAILWAY STOCK:						
Valued 31st December, 1912, at.....	956	17	7			
Now worth, at 105½ (ex div.)	934	15	0			
				22	2	7
DIMINUTION IN VALUE OF SUBSCRIPTIONS IN ARREAR:						
Valued 31st December, 1912, at	35	14	0			
Now estimated at	14	3	6			
Balance 31st December, 1913				21	10	6
				4,939	4	11
				£4,982	18	0

BALANCE SHEET.

	£	s.	d.	£	s.	d.
LIABILITIES.						
Amount due for Anthropological Notes and Queries on 1st January, 1913	71	1	6			
Less repaid.....	68	10	8			
	2	10	10			
Received during 1913	18	2	3			
				20	13	1
Total outside Liabilities				20	13	1
ASSETS.						
Books, Publications, and Stock				3,493	6	0
Furniture				200	0	0
Burma Railway £886 stock at 105½ (ex div.)				934	15	0
Metropolitan £300 Consolidated 3½ per cent. stock at 95½				286	10	0
Subscriptions in arrear, valued at				14	3	6
Publication Balances, stated at the amounts at which they stand in the accounts, but probably only of small value:						
Hobley's "Uganda"	21	7	4			
Less received in 1913..	16	4				
				20	11	0

Treasurer's Report for the year 1913.

11

Balances of previous Accounts :
Revenue Account
Capital Account.....
Less Library Account
<hr/> 5,171 14 5½ 18 4 0 <hr/>
232 9 6½ <hr/> 4,939 4 11
<hr/> 5,153 10 5½
Bibliography 51 8 0
Less received in 1913... 3 4
Physical deterioration 7 4 8
Less received in 1913 2 6
Sir E. Ray Lankester's lecture
(amount spent to date).....
80 18 10
Deduct balance to credit of Report
of Anthropometric Committee:
Amount 1st January, 1913
Received in 1913
18 11
2 8 4
Dayrell's "Ikoni Folk Stories":
Cost of production.....
Less paid by him.....
37 4 9
15 0 0
Sales.....
Cash:
In Bank
Less cheque outstanding
Petty cash (Assistant Secretary).....
157 6 7
10 0 0
147 6 7
1 7 2½
148 13 9½
3 7
148 10 2½
Less overpaid by Treasurer.....
19 7 3
77 11 7
£5,174 3 6½

ROBERT W. WILLIAMSON,
Hon. Treasurer.

We have examined the above accounts and compared them with the Books and Vouchers relating thereto, and find the same to be accurate.

(Signed) J. EDGE PARTINGTON, } Auditors.
G. UDNY YULE, }

January 13th, 1914.

PRESIDENTIAL ADDRESS.

THE RECONSTRUCTION OF FOSSIL HUMAN SKULLS.

BY ARTHUR KEITH, M.D., LL.D., F.R.S.

It has become apparent in recent years that the methods we are in the habit of using when examining and describing complete skulls are wholly inapplicable when we come to deal with the fragmentary skulls of fossil man. We cannot hope to discover intact skulls of ancient man: we have to build up our knowledge of the head-form of extinct races of mankind from such fragmentary and imperfect remains as chance and opportunity may send our way. We have to invent methods to meet the new conditions. My attention was drawn to the need of such methods several years ago, when Colonel Willoughby Verner presented to the Museum of the Royal College of Surgeons certain fossil fragments of a human skull which he discovered in a cave in Spain, under circumstances which indicated that these fragments formed part of the skull of an individual living in one of the later Palæolithic periods. There were only three fragments of the skull—a left temporal bone, the greater part of the left parietal, and part of the corresponding bone of the right side. I made several experiments to see how far it was possible, from these fragments, to reconstruct the size and form of the original skull, and found that the fragments were insufficient in this case to give more than a general indication of the head-form of the ancient cave-dweller. At the same time I also realized that a much more accurate reconstruction could be made from the study of such fragments than was usually supposed by modern anthropologists. Another opportunity came later. I obtained from the Museum at Bury St. Edmunds a cranial fragment which had been found in 1882 at a depth of 8 feet in brick earth, with worked flints of the second Acheulean period.¹ It was a fragment of a human skull—the only one of that early date which has been discovered in England. The fragment, little larger than the palm of a man's hand, represented that part of the vault of the skull which is formed by the hinder part of the frontal bone and anterior parts of the two parietals. None of those characters which we associate with the skulls of Neanderthal man was present. In trying to determine the form of the original skull, of which the fragment had formed part, I searched amongst modern and ancient crania until I found one which showed the same contours in the fronto-

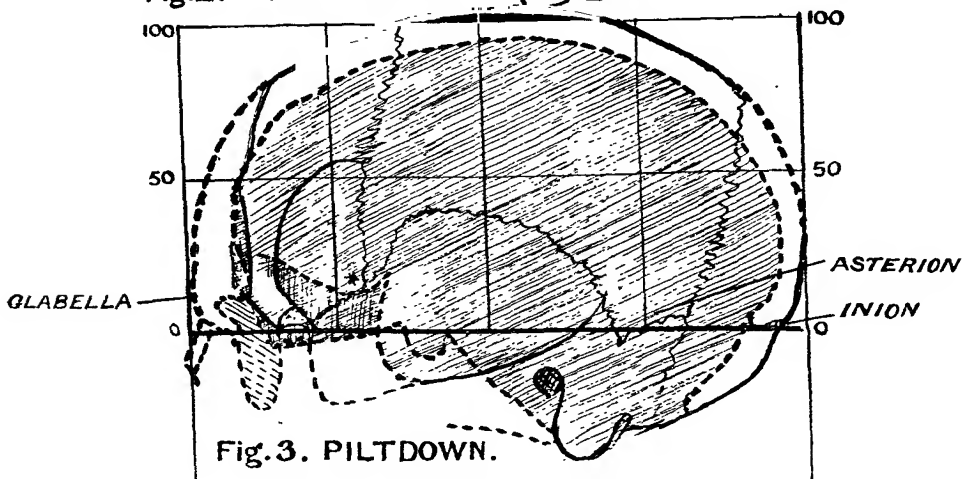
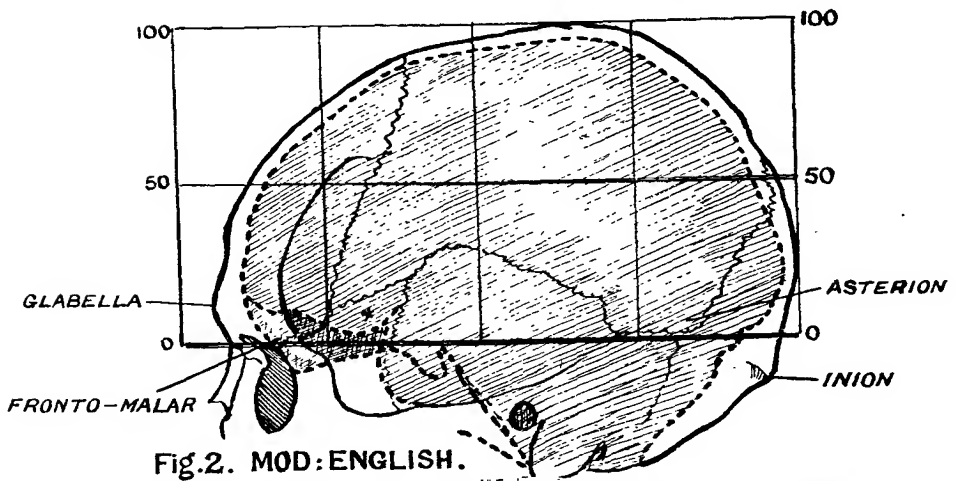
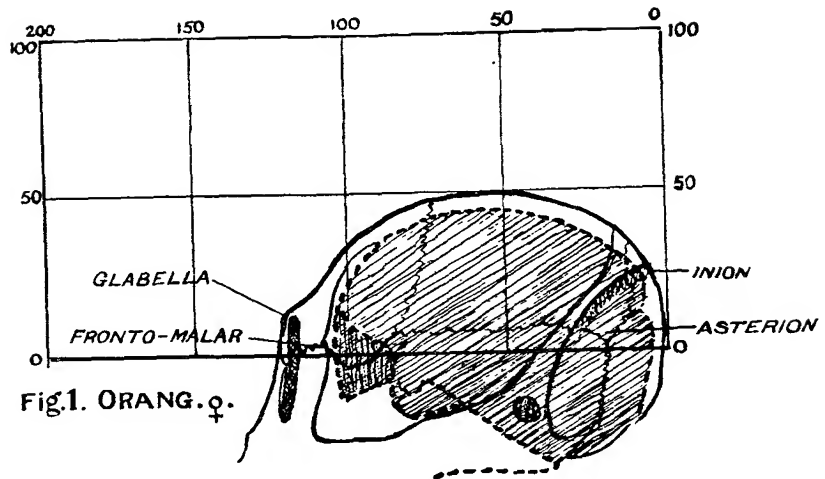
¹ See *Journ. Anat. and Physiol.*, 1912, vol. xlvii, p. 73.

parietal region. Using such a skull as a basis, I modelled in clay a specimen into which the Bury St. Edmunds fragment could be fitted. Such a reconstruction is founded on the belief that there is a definite correlation in size and shape between the various parts of the skull, and being based on inference, cannot be regarded as more than a crude approximation to the truth.

There was another reason which led me to re-examine the methods we use when studying human skulls. The particular object we have in view is to discover the size and form of brain indicated by such cranial fragments. The height to which the vault of the skull rises above the ear passages is certainly one of the most valuable measurements which is needed for estimating the size of brain. Unfortunately, the temporal bone, which carries the ear passage, is seldom recovered, so that we cannot use, as a basis for our measurements, the Frankfort plane; that plane passes through the ear passage and lower border of the orbit. The lower parts of the orbits are almost invariably broken away. There is another standard plane employed as a basis for measuring the height of the cranial vault and of calculating the size of brain—one passing through the glabella (the projection on the forehead above the root of the nose) and the external occipital protuberance at the back of the head, just above the attachment to the neck (*see* Figs. 1, 2, 3). These two points, the glabella and external occipital protuberance, are usually preserved on fossil skulls. Unfortunately, their position is movable as regards the brain cavity. The degree to which they shift on the surface of the cranial case is very apparent in the skulls of growing anthropoids.¹ In young anthropoids these two points are situated low down on the skull, so that the vault of the skull rises high above the inio-glabellar line. As the animals grow, their faces and necks enlarge, while their cranial cavity and brain size remain nearly stationary. The inion or external occipital protuberance ascends from the base towards the vertex of the skull as the neck grows; the glabella also ascends as the orbits enlarge and the facial skeleton increases in dimensions. Indeed, in adult anthropoids the inio-glabellar line may rise almost to the level of the cranial roof (Fig. 1). What happens in anthropoid apes is just what may occur in the more early forms of fossil man. Indeed, we know that in one form of ancient man—the Neanderthal species—such a change does occur, and if we use the inio-glabellar line as a basis for our measurements, we shall greatly under-estimate the size of the brain in that form of ancient man.

The base line which I have employed during the last two years in orientating fragmentary skulls, is one drawn from the hinder lower angle of the parietal bone to the outer end of the external angular process of the frontal bone (*see* Figs. 1, 2, 3). These two points are usually preserved and they have a definite and fairly constant relationship to the brain. The hinder point, the asterion, marks the attachment of the partition which separates the cerebrum above from the cerebellum below. The anterior point, the fronto-malar, lies nearly on the same plan as the lowest lateral convolution of the frontal lobe in all known types

¹ *See* Keith, *Journ. Anat. and Physiol.*, 1909, vol. xlv, p. 251.



- FIG. 1.—SKULL OF ORANG ORIENTATED ON THE PLANE DESCRIBED IN THE TEXT. THE BRAIN CAVITY IS SHADED. THE BASE OF THE SKULL IS INDICATED BY A STIPPLED LINE ($\frac{2}{3}$ NATURAL SIZE).
- FIG. 2.—DRAWING, SIMILAR TO THAT SHOWN IN FIG. 1, OF THE SKULL OF A MODERN ENGLISHMAN WITH A CAPACITY OF 1425 C.C. ($\frac{2}{3}$ NATURAL SIZE).
- FIG. 3.—RECONSTRUCTION, BY THE WRITER, OF THE PILTDOWN SKULL, ORIENTATED ON THE SAME PLANE AS SKULLS IN FIGS. 1 AND 2.

of human skulls, and this is also the case in the skulls of anthropoids (Fig. 1). The relationship in anthropoids is peculiar, but it is possible to recognise the existence of a simian condition from the depth to which the frontal bone descends in the temporal fossa, on the side of the skull behind the external angular process (Fig. 1). As may be seen from Figs. 1, 2, and 3, the relationship of the brain to the external angular process in the Piltdown skull conforms to the human, not to the anthropoid arrangement.

Those earlier attempts of mine to elaborate and apply new methods to the interpretation and reconstruction of fragmentary skulls passed without exciting any serious opposition from my fellow anatomists. The whole matter was looked upon as one of academical, rather than of practical, importance until the discovery at Piltdown. The difference between our methods then became apparent, for the same fragments which led Dr. Smith Woodward to estimate the brain capacity of *Eoanthropus* at 1080 c.c.—an estimate which was confirmed at a later date by my friend Professor Elliot Smith—whose estimate was 1100 c.c.—gave in my hands a brain which, in point of volume, was that of an average modern European. The actual brain cast obtained from my reconstruction of the skull displaced 1500 c.c. of water. Another estimate made from measurements of the skull, when allowance was made for the great thickness of the Piltdown bones, gave, by the Lee-Pearson formula, a smaller capacity, 1460 c.c. I accounted for the difference between the formula-estimate and the actual measurement as due to the great capacity of the Piltdown skull in the occipital region. The marked discrepancy between the reconstructions of the Piltdown skull by Dr. Smith Woodward and myself gave a practical importance to the methods employed by each of us. It was plain to everyone we could not both be right, and yet neither of us lost faith in the method we had employed, and we both stuck by our results. At this juncture my friend Professor F. G. Parsons came to me with a very practical proposal, namely, that he and some of his fellow anatomists should select a skull, from which fragments such as were found at Piltdown should be cut. It was agreed that the middle line should be nowhere apparent or clearly indicated on the fragments so prepared. The intention was to present me with a close imitation of the Piltdown problem, but one in which the right answer was known to those who contrived the experiment. The conditions in the “test” and Piltdown cases were the same, for it is apparent, from Dr. Smith Woodward’s own description, that the fragments of the Piltdown skull—with the exception of the mandible, are eminently human in their size and shape. I willingly accepted the proposal made to me and promised to attempt to reconstruct the skull from the fragments given me. Further, some weeks before the fragments reached me I handed in the title of this address and promised that the results of the experiment—whether they were confirmatory of what I had maintained regarding the accuracy with which the original form could be restored, or whether they proved my assertions to be baseless—would be placed fairly and fully before the Annual General Meeting of this Institute.

On January 6th, a fortnight before the General Meeting, a small box containing the fragments arrived from Dr. Douglas Derry, of University College. One essential part was omitted—namely, the small occipital fragment, which is absolutely necessary for the estimation of the width of the hinder part of the head and the position of the occipital bone—the fragment indicated in Fig. 4, D. The missing fragment was sent to me subsequently and on January 12th I handed the reconstructed skull to Dr. Derry with drawings I had made of it from the side, from the front, from above and from behind. I then asked to see the cast of the original skull. As regards the width and the auricular height the reconstruction and original were in close agreement; the difference in each case was less than 2 mm. The reconstruction reproduced fairly closely the salient features of the original—a narrow, rather long, somewhat boat-shaped skull in which the sagittal suture along the vault had become prematurely closed. The cranial capacity of the original skull was 1395 c.c.; the estimated capacity of the reconstruction was returned by me as 1415 c.c. In length, however, there was a serious error. My estimate of the maximum length of the reconstruction was 195 mm.; Dr. Derry's measurement of the original skull was 184 mm. A difference of 11 mm. appears, at first sight, to be a very serious one, but we found that the discrepancy was largely due to the fact that we were measuring on different planes. On Dr. Derry's plane the length of the reconstruction was 190 mm.—still leaving a difference of 6 mm. The exaggerated length was due to two wrong inferences on my part: first, I had concluded from the mastoid process that the skull I had to reconstruct was that of a male—whereas the characters of the forehead showed plainly that it was that of a woman. Hence I supplied the reconstructed skull with the supra-orbital ridges of a male—increasing the length by 3 or 4 mm. In the original skull the forehead was prominent above, and receded or drew in as it approached the root of the nose (Fig. 5). That feature I had failed to infer correctly. Excepting the forehead, the reconstruction was a fairly faithful reproduction of the original and gave me fresh faith in the methods which I employed.

I left the reconstruction in Dr. Derry's keeping and borrowed the cast of the original. From this cast exact tracings were taken. By comparing the two sets of tracings—those taken from my reconstruction and those taken from the cast of the original skull, it will be seen how far I had succeeded in reproducing the essential features of the test specimen. Subsequently the reconstruction and the drawings were checked by Professor Parsons.

The fragments which were given me to form the basis of a reconstruction are shown in Fig. 4; they are replicas of the Piltdown fragments. On the largest of these, representing the greater part of the left side of the skull, the coronal suture was apparent as it ascended between the frontal and parietal bones, until it ended at the cut upper margin of the fragment. There was no trace of the sagittal suture, but from an inspection of the vascular markings on the deep or cerebral aspect of the fragment I came to the conclusion that, just in front of the upper end of the coronal suture, the frontal bone crossed the middle line for about the distance

of 10 mm.—the distance in the Piltdown fragment being 15 mm. It was plain, too, from an examination of the vascular markings on the deep surface, that nowhere, except in the frontal region, did the fragment reach the middle line, although at the hinder end it was plain that there was a near approach to the middle line. The left temporal bone was also given to me, the upper part of its squamous plate being cut away (Fig. 4). There was a fragment of the right

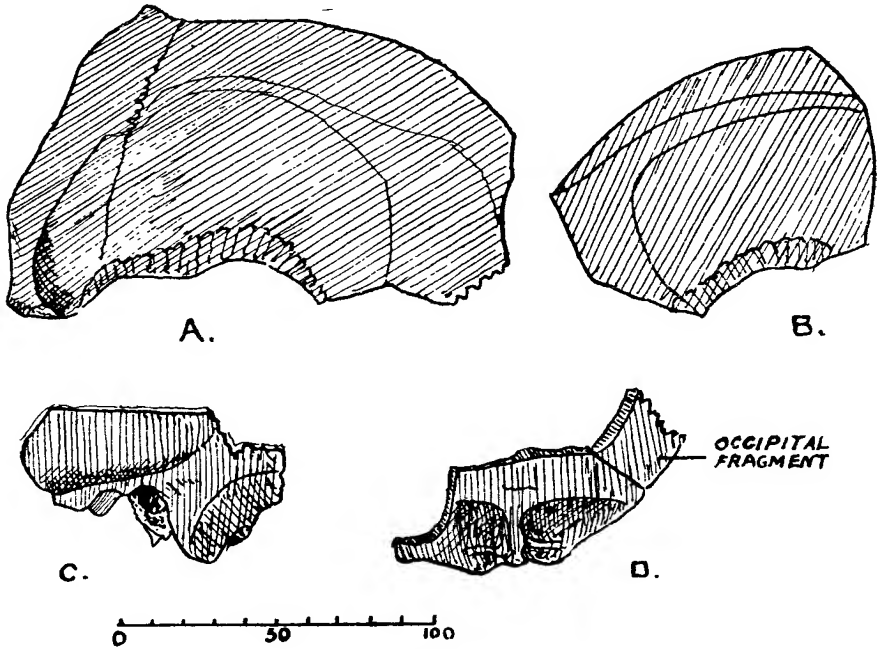


FIG. 4.—THE CRANIAL FRAGMENT FROM WHICH A RECONSTRUCTION HAD TO BE MADE. A, LEFT FRONTO-PARIETAL FRAGMENT; B, RIGHT PARIETAL FRAGMENT; C, LEFT TEMPORAL; D, OCCIPITAL FRAGMENT.

parietal bone, on which part of the lower border, for articulation with the right temporal bone, was preserved. Even less of the occipital bone was given me than is preserved in the corresponding Piltdown specimen. On the other hand, I had this advantage—there was no doubt as to the exact position of the extra fragment of the occipital of which mention has been already made.

If I were to follow the natural order of events, I should describe, step by step, the manner in which I built up the fragments into a complete skull. Such a description, necessarily technical and tedious, will be more easily understood at a later stage of my address when I have contrasted my reconstruction with the original skull from various points of view. The comparison will also provide me with an opportunity of showing the Piltdown fragments side by side with corresponding fragments from a modern skull, one with a capacity of nearly 1400 c.c. The most instructive view, and the one which I shall take first for comparison, is the lateral or profile aspect of the skull. In Fig. 5 the reconstructed and the original skulls have been set on the plane which has been already described. The two outlines agree fairly closely, except in front; in the region of the forehead,

as I have already admitted, I made a blunder of considerable magnitude. Not only did I mistake the sex, but I did not detect any indication in the contour of the bones of the vault which led me to infer that the forehead drew in or receded as it descended. If I had looked closely at the small area for the attachment of the neck to occipital region of the skull, I ought to have recognized that it was the

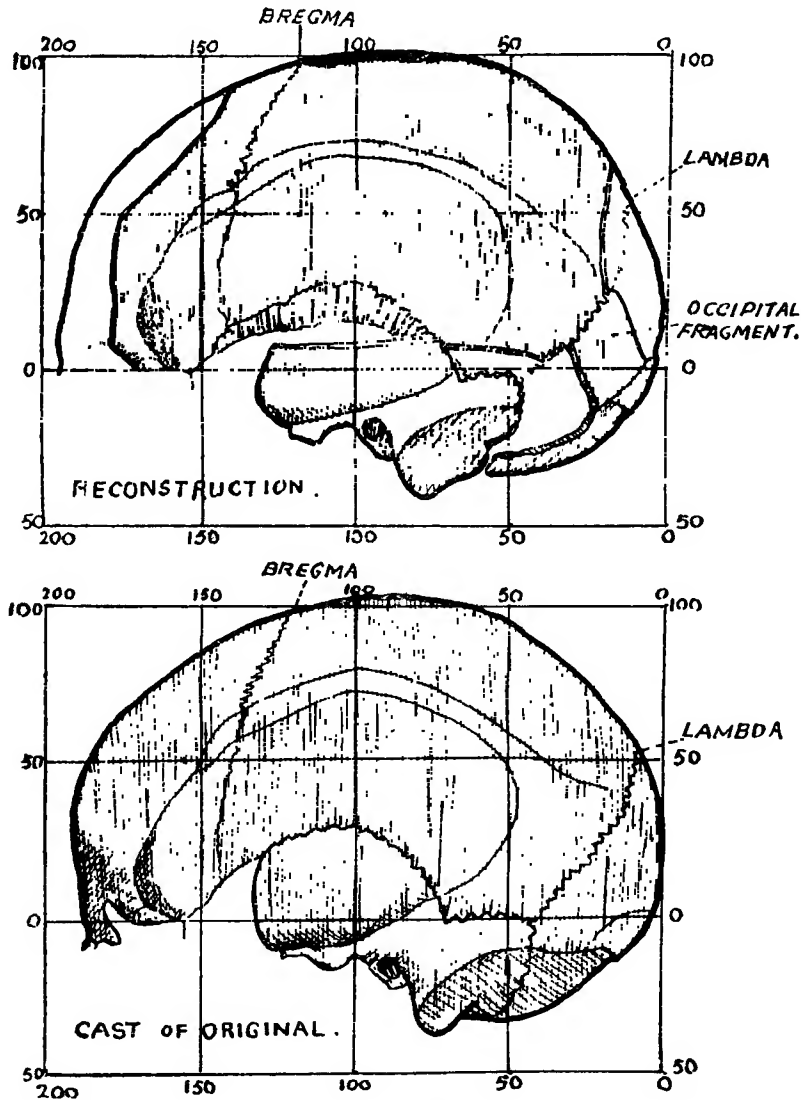


FIG. 5.—PROFILE OF RECONSTRUCTED SKULL COMPARED WITH A CORRESPONDING DRAWING OF THE CAST OF THE ORIGINAL SKULL ($\frac{2}{3}$ NATURAL SIZE).

skull of a woman—not one to be furnished with projecting eye-brow ridges. I believe a careful study of the bones of the vault would also have given a clue to the shape of the forehead, but such problems are new; we have never studied the correlation which exists between the various parts of the skull. There is the same degree of uncertainty as regards the forehead of the Piltdown skull. The

only point we are certain of, as regards the form of the forehead, is that it was not shaped as in Neanderthal man. The form of the outer part of the supra-orbital ridge, preserved on the fragment of the left frontal, assures us of that fact. In Fig. 6 it will be seen I have given a considerable projection to the supra-nasal part of the frontal bone of the Piltdown skull. That is an inference founded on the size

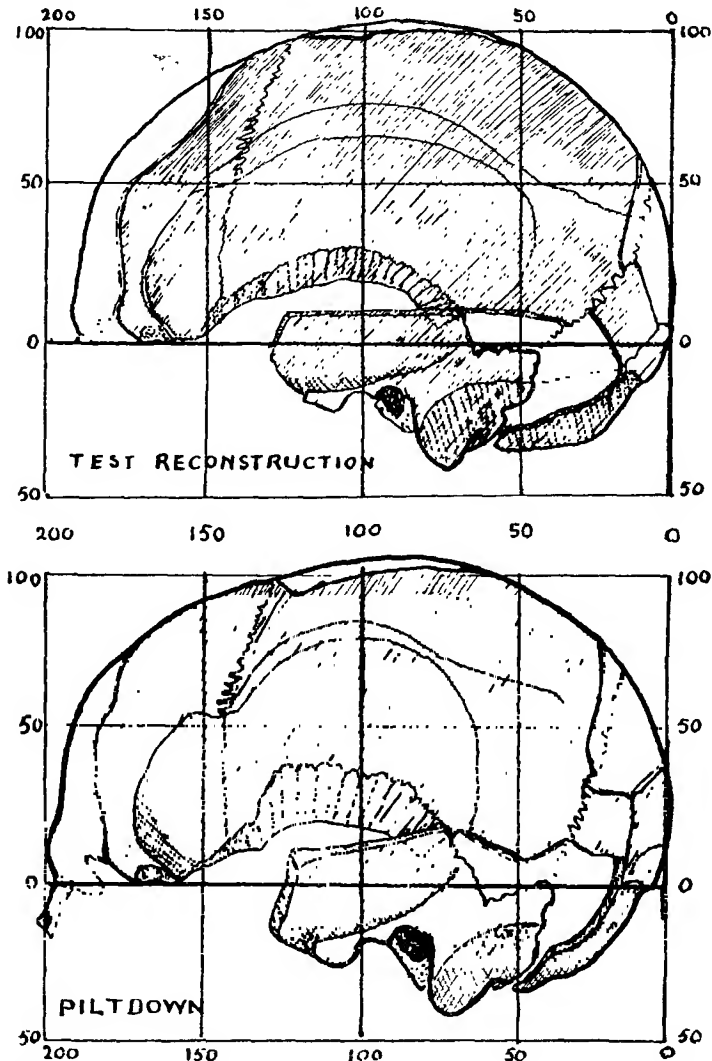


FIG. 6.—RECONSTRUCTION OF THE TEST SKULL COMPARED WITH THE AUTHOR'S RECONSTRUCTION OF THE PILTDOWN SKULL ($\frac{2}{3}$ NATURAL SIZE).

of the mandible. Such a mandible must have been part of a large and strong face, which, for mechanical purposes, would require to be supported from the forehead. My attempt at reconstruction of the test skull shows how uncertain is our basis when we have to model the forehead.

When viewed in profile, very little of the deficiency in the upper border of the parietal bone and along the vertex of the skull is visible (Fig. 6). The

restoration of the upper border of the parietal bones is best dealt with when we come to examine the reconstruction of the skull from above. As regards the lower border of the parietal bone, it is seen to be intact except at the posterior corner, where a part is missing (Fig. 5). It will also be noticed that part of the squama of the temporal bone is missing. The amount missing in each case—from the corner of the parietal and upper border of the squama—is determined by a correct articulation of the temporal with the parietal. The important question has to be first settled—which is the correct articulation? In this test skull, as in the Piltdown, there is absolutely no doubt that on the left temporal, and on the left parietal, there is preserved a point at which the two bones came in contact during life. The point is shown in both Figs. 5 and 6. But, having brought those points in contact, we may so alter the temporal bone that the gap between the lower border of the parietal and upper border of the squama is wide or narrow. The correct position is determined by a number of indications. There are the impressions of the cerebral convolutions and vascular markings seen on the inner aspect of the bones. The position we select must be such as will bring the corresponding impressions into harmony. There are also external indications. Impressions giving the size and shape of the great wing of the sphenoid can be seen on the lower border of the parietal and frontal bones and also on the anterior border of the squama (Fig. 5). The position we give to the temporal bone must be such as provides for these markings, and for the accommodation of the great wing of the sphenoid bone. At the hinder end of the parietal and temporal bones there is another useful indication. The suture between the parietal and occipital bones ends at the hinder upper angle of the temporal bone: the suture on the hinder margin of the parietal indicates the position which the mastoid angle of the temporal bone should occupy. The position given to the temporal bone must bring the root of the zygomatic process into such a direction as will give the arch a normal relationship to face and orbit. In the case of a modern skull there is no doubt as to the pitch which has to be given to the zygomatic arch: its upper border points straight to the lower border of the orbit. Was this the case in the Piltdown skull? In adult anthropoids the zygomatic arch pitches below the lower border of the orbit. The arch is situated at a lower level as regards the base of the skull than is the case in human crania (Figs. 1, 2). Now, there are indications that the pitch of the zygomatic arch in the Piltdown skull had the same direction as in anthropoids. It forms a more acute angle with the anterior border of the mastoid process than is the case in modern skulls. The mandible is anthropoid in character; so are the canine teeth. We may infer, therefore, that the zygomatic arch, which, like the mandible, is part of the apparatus of mastication, was also anthropoid in character. Hence, in my reconstruction of the Piltdown skull I have given the zygomatic arch a lower pitch than in modern skulls. It will be seen that I estimated the extent of the deficiencies between the parietal and temporal bones in the test skull with a considerable degree of accuracy.

So far our attention has been directed to the extent of the deficiencies at the

upper and lower borders of the parietal bone. We shall now turn our attention to the anterior and posterior borders of that bone. As regards the anterior border, defined by the coronal suture, there is little to be said. In both the Piltdown and test skulls this border is almost complete, and in both skulls the border passes upward at almost the same oblique angle from the line or plane on which the skulls have been orientated (*see* Figs. 5, 6). The hinder border, in contrast to the anterior, is broken away except at one part, just above the lower hinder angle. In the test skull, as in the Piltdown, we have clear indications of the position and direction of the lower part of the lambdoid suture; without this indication, reconstruction would be an impossibility. The first importance of the preserved part of the suture is this—we obtain from it the extent to which the occipital bone projects backwards, and indirectly we learn how much of the hinder border has been broken away from the upper part of the parietal bone. I have already emphasised the importance of that fragment of the occipital bone which reaches up to the lambdoid suture on the right side (Fig. 7). The part of the lambdoid suture which has been preserved for us, however, is on the left side. It is an easy matter in our drawings to reverse the sides so that right becomes left. When reversed we have a means of articulating the occipital with the parietal fragment (Fig. 5). Even when reversed there still remains a doubt as to which part of the lambdoid suture the occipital fragment comes in contact with—whether high up or low down in the suture. Its level is indicated by the lowest part of the occipital bone. That part of the bone lies on a level with a definite element of the mastoid part of the temporal bone, as is shown in Figs. 5 and 7. In the case of the test skull we apply the occipital bone, as indicated in the reconstruction (Fig. 5), with a feeling of certainty. But there is not the same degree of certainty in the case of the Piltdown skull, for this reason—that part which I have named the “occipital fragment” undoubtedly represents part of the right half of the occipital bone. There is no other region of the skull into which it can be fitted: its characters agree perfectly well with the position given to it by Dr. Smith Woodward, with one slight alteration. There is no doubt that the contact between the occipital fragment and the occipital bone, as represented in the original specimen, is not a true and good one. There is an intermediate fragment missing—not of great extent—not more than 5 or 6 mm. in width. The absence of this splinter complicates the problem of reconstruction, but does not prevent a reliable solution. As in the test skull, the relationship of the occipital bone to the mastoid gives us the level of the occipital bone; the occipital fragment, when articulated with the lambdoid suture on the left side, gives us the backward extension of the occipital region of the skull. The solution of the occipital problems offered no difficulty in the reconstruction of the test skull. In my opinion the problem is of the same nature and open to the same method of treatment in the case of the Piltdown skull.

Having obtained the backward projection of the occiput, we are now in a position to determine the amount missing from the hinder border of the parietal bones, and to fix the position of the lambda—the point at which the sagittal suture

between the parietal bones meets the lambdoid suture (*see* Fig. 5). When skulls of the modern type are orientated on the same plane as the test skull (Fig. 5) the lambda is found to occur at a definite distance in front of the vertical line which marks the posterior end of the skull. It is seldom more than 12 mm. in front of the vertical and rarely less than 5 mm.; 8 or 9 mm. is the usual distance. It was this fact which guided me, in reconstructing the test skull, to place the lambda in the position which it occupies in Fig. 5. The fact was then revealed to me that about 15 mm. was missing from the hinder end of the left parietal bone. I have applied the same rule to the Piltdown skull, for in their conformations the bones of that skull are of the modern type. In that case also there is a part missing from the hinder end of the left parietal bone at least 15 mm. in extent, perhaps more.

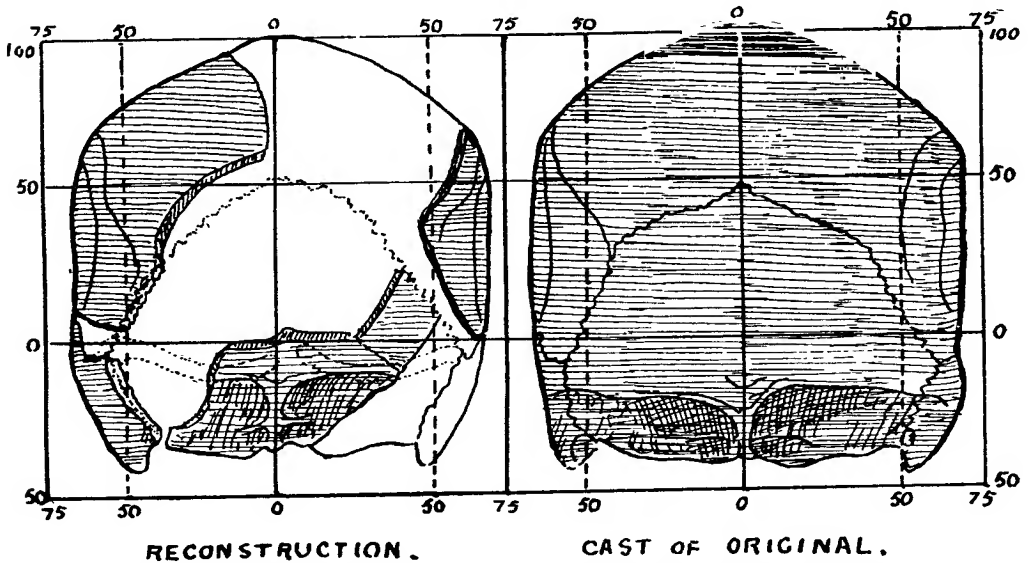


FIG. 7.—HINDER OR OCCIPITAL ASPECT OF THE RECONSTRUCTED TEST SKULL COMPARED WITH A CAST OF THE ORIGINAL.

A very peculiar feature characterizes the lambdoid suture of the Piltdown skull. In modern skulls—except in cases of extreme brachycephaly—the lambdoid suture slopes upwards and backwards, the upper border of the parietal projecting much farther backward than the lower border. In the Piltdown skull the lambdoid suture is more vertical—a primitive feature (Fig. 6). In Neanderthal skulls the lambda is situated much farther in front of the occiput than in modern skulls, but the Piltdown skull shows no Neanderthal feature in its occipital region and therefore we suppose that the lambda was placed as in modern skulls.

We now take up the consideration of a very important aspect of the skull—one which has been somewhat neglected by anatomists—the hinder or occipital, represented in Fig. 7. In the process of reconstruction the final test of the accuracy with which the missing parts have been supplied, and the fragments articulated, is applied on this aspect of the skull. If the true middle line of the vertex of the skull has been rightly identified, if the parietal bones have been

justly made good and articulated, the temporal bone placed rightly, then the occipital bone slips into its place and fits exactly the space left for its articulation. If a mistake has been made the occipital bone cannot be fitted in: the skull may be too wide or too narrow, too high or too low. If, however, the occipital bone can be fitted in, and takes up normal relationships with surrounding bones, then we may assume that a true reconstruction has been accomplished. In all the steps of the reconstruction we presume that the right and left halves of the skull are approximately symmetrical, as shown in Fig. 7.

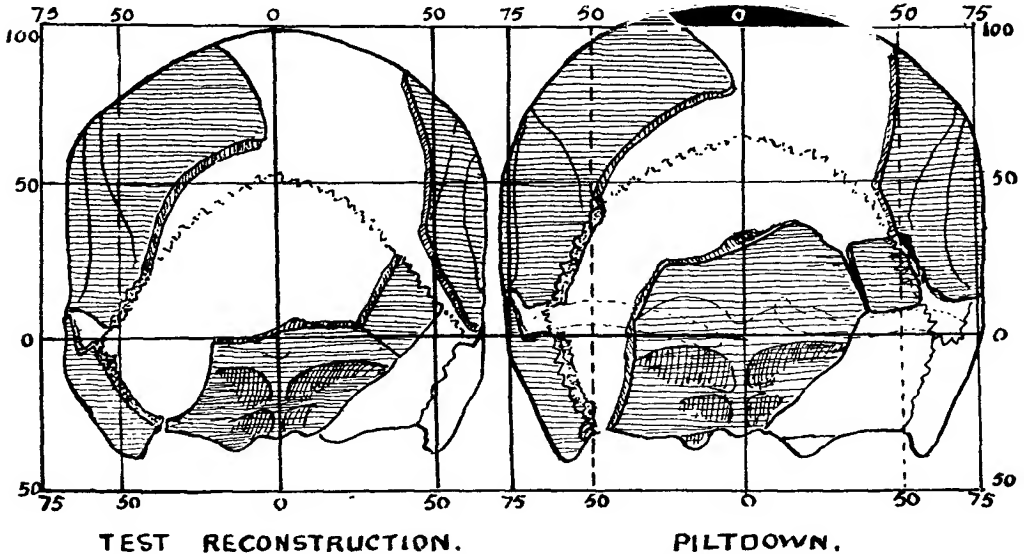


FIG. 8.—HINDER OR OCCIPITAL ASPECT OF THE RECONSTRUCTION OF THE TEST SKULL COMPARED WITH THE AUTHOR'S RECONSTRUCTION OF THE PILTDOWN SKULL.

If we examine the original of the test skull (Fig. 7) it will be seen that the right and left halves of the lambdoid suture are almost symmetrical: both cut the 50 mm. vertical line at almost the same point. Further, it will be seen that the mastoid parts of the temporal bones, and the sides of the skull, formed chiefly by the parietal bones, are symmetrical. The lines marking the origin of the temporal muscles occur at almost identical points on the two sides. In the reconstruction those features have been reproduced. The width and height of the reconstruction are almost the same as in the original skull. The points which guided me in obtaining this result were first the bony ridge which descends in the middle line of the lower part of the occipital bone, and which marks the junction of the right and left halves of the neck (Fig. 7). There is no truer guide, in normal skulls, to the exact middle line than this median occipital ridge; that must be placed in the mid-line of the reconstruction. When this ridge is placed in the middle line, then the occipital fragment carrying part of the lambdoid suture gives us the exact width at which the hinder borders of the parietal bones must be placed (Fig. 7). The occipital bone guides us to the width of the skull behind. There is an additional factor which one must keep in mind.

In the test skull, very little of the occipital bone above the attachment of the neck was given me—not nearly so much as in the Piltdown skull. In that specimen there is no doubt, from the arrangement of the impressions made by the brain, that the left occipital lobe was much larger than the right—a condition which is best seen in the most highly developed modern brains. Where there is a great preponderance of the left occipital lobe the left half of the occipital bone shares to some degree in this preponderance, and hence in the Piltdown skull there is some degree of asymmetry in the lambdoid suture—the left half passing farther beyond the 50 mm. line on the left than on the right side. In the test skull a small

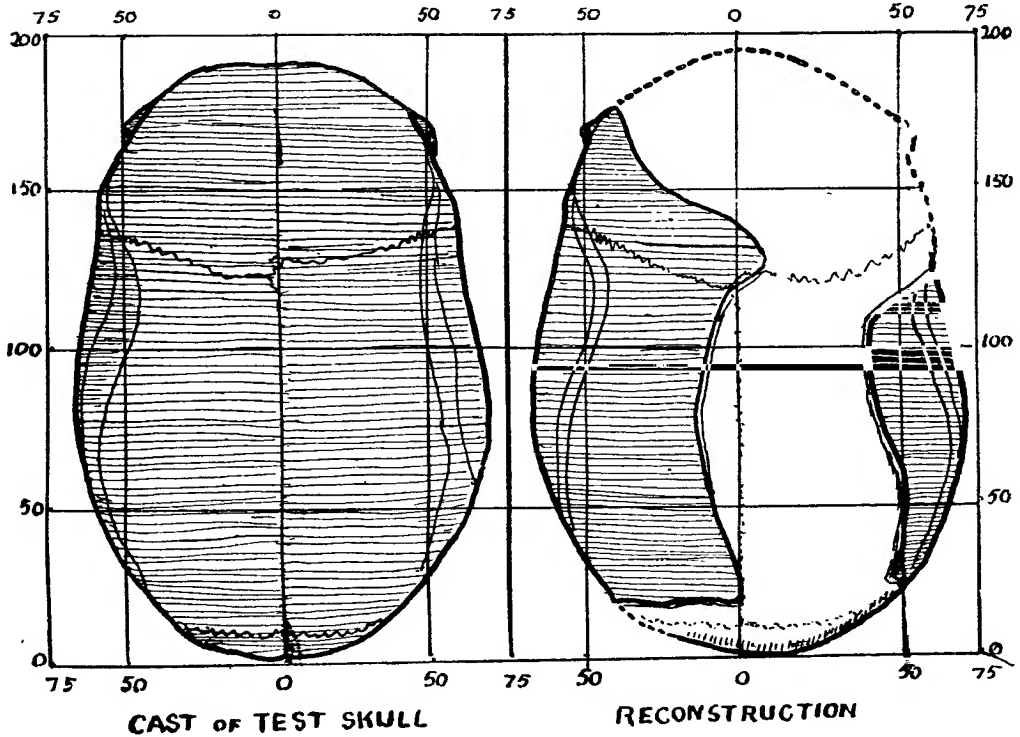


FIG. 9.—THE RECONSTRUCTED TEST SKULL VIEWED ON ITS UPPER ASPECT, AT RIGHT ANGLES TO THE PLANE EMPLOYED IN FIGS. 5 AND 7, COMPARED WITH THE CAST OF THE ORIGINAL SKULL.

part of the bony ridge which lies between the right and left occipital lobes of the brain was present—enough to show me that there was a much less degree of preponderance of the left occipital lobe than in the Piltdown skull. Hence the lambdoid suture was worked out almost the same on the two sides. While placing the occipital fragment in position one must keep an eye on the impressions for the lateral blood sinuses. If we are proceeding rightly in the placing of parts, these sinuses will be directed towards the lower angles of the parietal bones. The position and relationships of these sinuses are the same in the Piltdown skull as in the test skull.

When we come to compare the test specimen with the Piltdown skull the similarity of the technique required for their reconstruction becomes apparent.

What holds true of the one must hold true of the other, for the fragments are shaped in a mould of the same type. The modern skull is the more symmetrical and the smaller. If we deduct 5 mm. from the height of the Piltdown skull, on account of the thickness of its vault, it will be seen that the test skull, with a capacity of 1395 c.c., is almost of the same height—115 or 116 mm. In width, however, even allowing 10 mm. for the greater thickness of the Piltdown skull, the test skull is the smaller. Its width is 133 mm.; that of the Piltdown skull is at least 150 mm., which gives, for comparison with modern skulls, a width of at least 140 mm. In length, the two skulls, when allowance is made for the thickness of the fossil specimen, are almost the same. It is manifest, then,

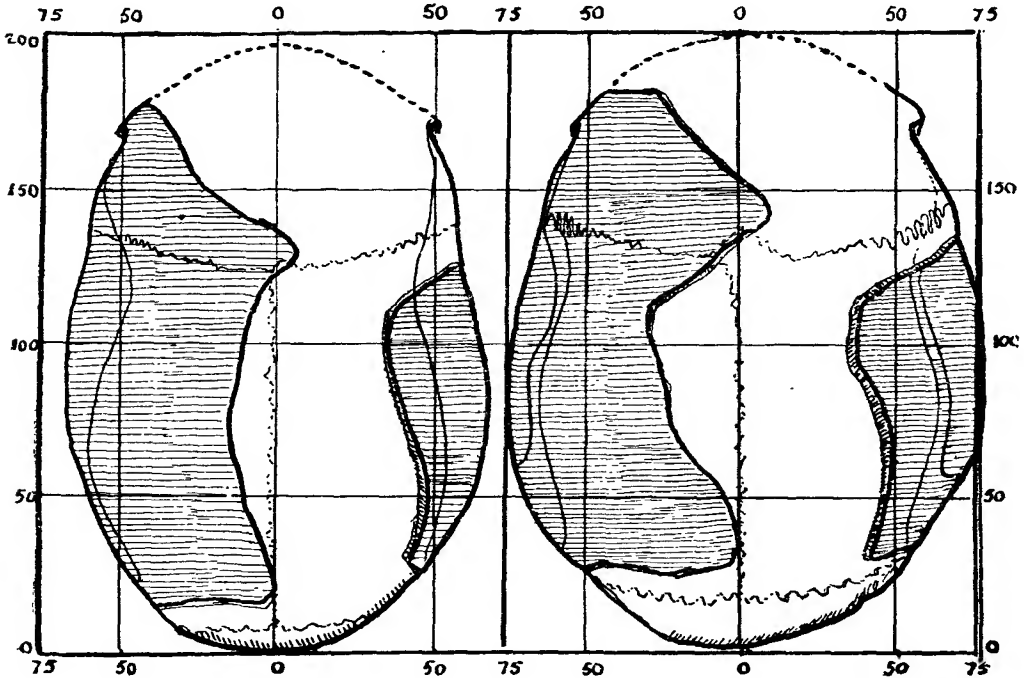


FIG. 10.—UPPER ASPECT OF THE RECONSTRUCTED TEST SKULL COMPARED WITH THE CORRESPONDING VIEW OF THE PILTDOWN SKULL AS RECONSTRUCTED BY THE AUTHOR.

that the cranial capacity must be much more than the official estimates of 1080 or 1100 c.c. for the Piltdown skull. Its capacity, if we estimate from the diameters of the skull and not from the measurement of the brain cast itself, must be nearer 1500 c.c. than 1400 c.c.

It is when we compare the upper or vault aspect of a reconstructed skull with the same aspect of the original that we apply the most severe test to our task. The greater part of the vault has to be built up from inference. How far I succeeded in identifying the middle line correctly will be seen from Figs. 9 and 10. As in the Piltdown skull, it was only necessary, in the test case, to identify the middle line at two points. The first of these is in front, in the region of the bregma, the point where the suture between the right and left parietal bones

meets the coronal suture. The coronal suture of the left side, both in the Piltdown and test skulls, is seen to reach the broken upper margin of the fronto-parietal fragment (Figs. 9 and 10). When the coronal suture reaches the bregma in the normal skulls, its direction begins to change; in the specimens with which we are concerned its direction has not changed. We may presume, independently of other evidence, that the left coronal suture has not yet reached the bregma and middle line. Just in front of the upper end of the coronal suture there is a projecting tongue of bone, which we may call the frontal projection. On the hinder margin of the projection, best seen in the original Piltdown specimen,

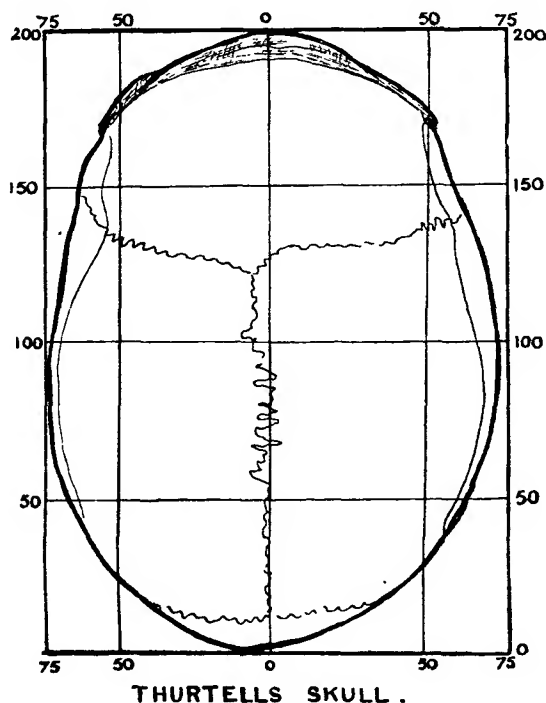


FIG. 11.—UPPER ASPECT OF THE SKULL OF AN ENGLISHMAN (CUBIC CAPACITY 1620 C.C.), SHOWING AN ASYMMETRICAL ARRANGEMENT OF SUTURES IN THE REGION OF THE BREGMA.

there can be recognised a faint but certain trace of an irregular suture. To understand this irregularity—one which can be seen in 3 or 4 per cent. of modern skulls, particularly in large skulls—we must study such a specimen as is represented in Fig. 11. There it will be seen that the sagittal suture joins the coronal 4 mm. to the left of the middle line. The bregma is situated eccentrically. From the bregma the coronal suture passes obliquely forward and to the right for a distance of 15 mm., and then suddenly turns to the right and falls into its normal position. The anomaly is due to the fact that, while the right parietal bone is larger than the left, the right half of the frontal bone is smaller than the left. The oblique part of the coronal suture passes from the mid-parietal to the mid-frontal point. The middle line of the skull is somewhere between these points. In the test skull this irregularity of the upper part of the coronal suture was also present.

There was thus no definite indication of the middle line on the external aspect of the fragments. On the inner or cerebral aspect of the frontal projection there was a definite indication of the longitudinal blood sinus, which is usually situated approximately in the middle line. The inner aspect of the bone, actually in contact with the sinus, is smooth. At the lateral margins of this smooth sinus area are seen fine vascular markings, indicating a terminal fringe of vessels—just such a meningeal fringe as one finds ending on the margins of the longitudinal sinus in modern skulls. In the test fragment, and in the Piltdown, I selected this smooth area as the most reliable guide to the middle line of the skull in front.

In the posterior part of the skull the selection of the mid point in the case of the test skull was rendered difficult because it was evident, from an inspection of the vascular markings, that all the area in contact with the longitudinal sinus had been cut away, and perhaps a narrow strip beyond the margin of the sinus. I concluded that not more than a millimetre or two beyond the groove for the sinus had been cut away. In the case of the Piltdown skull there is absolutely no doubt in my mind that the left parietal fragment, at its hinder end, just reaches the edge of the sinus groove. The sharp lateral margin of the groove can be felt and seen on the fragment. On this inner projecting edge are seen the fringe markings already alluded to—sure indications, in my opinion, of a close approach to the middle line. The position of the middle line was fixed provisionally from the markings seen on the inner aspect of the fragments of the cranial vault. If a mistake has been made as to its position, the error soon becomes manifest in the process of reconstruction. In the first place, if we use a false middle line, the various parts of the parietal bones assume an asymmetrical position when they are set together in the reconstructed skull. Or, if a false symmetry be obtained, then the frontal projection will be found to be out of position as regards the general level of the cranial vault. Further, the skull will be too wide or too narrow, so that the occipital bone cannot be fitted into place. A mistake in the identification of the middle line gives rise to a series of deformities. In the case of the test skull, the middle line which I chose at first had to be only slightly adjusted to give a series of correct fittings with symmetry of the two sides.

In the case of the Piltdown skull there is one serious difficulty. We have seen that there is a natural asymmetry of the occipital lobes, and to a slighter extent of the two halves of the occipital bone. The serious difficulty is connected with the frontal region. If the middle line be placed so as to cross the frontal projection immediately over the marking I have described for the longitudinal sinus—that is at a point 15 mm. from the tip of the frontal projection—there still remains a considerable degree of asymmetry. The right parietal region appears flat and drawn in when compared with the left side. If, however, the middle line be placed almost across the tip of the frontal projection—which is certainly to the right of the middle line as indicated by the cerebral and vascular markings—the asymmetry of the right side almost entirely disappears. The right parietal bone is nearly 2 mm. thinner than the bone of the right side, and I am inclined to suppose

that there was in life a degree of asymmetry—beyond what is seen, except on rare occasions, amongst modern skulls.

The reconstruction reproduces fairly closely the outline of the vault of the original skull—one in which the sagittal suture had been prematurely obliterated, leading to a post-coronal constriction and a narrowing and elongation of the skull (Fig. 9). The comparison of the two reconstructions—the test skull and Piltdown—is of interest (Figs. 9, 10). The similarity of the problem in the two cases is apparent. It is also apparent, making all allowance for the thickness of the fossil specimen, that the Piltdown skull is the larger. This ancient skull does not reproduce the narrow elongated form seen in such specimens as the Galley Hill and Combe Capelle, but is rather of the ovoid type.

The frontal aspect of the reconstruction can be dismissed with a brief notice.

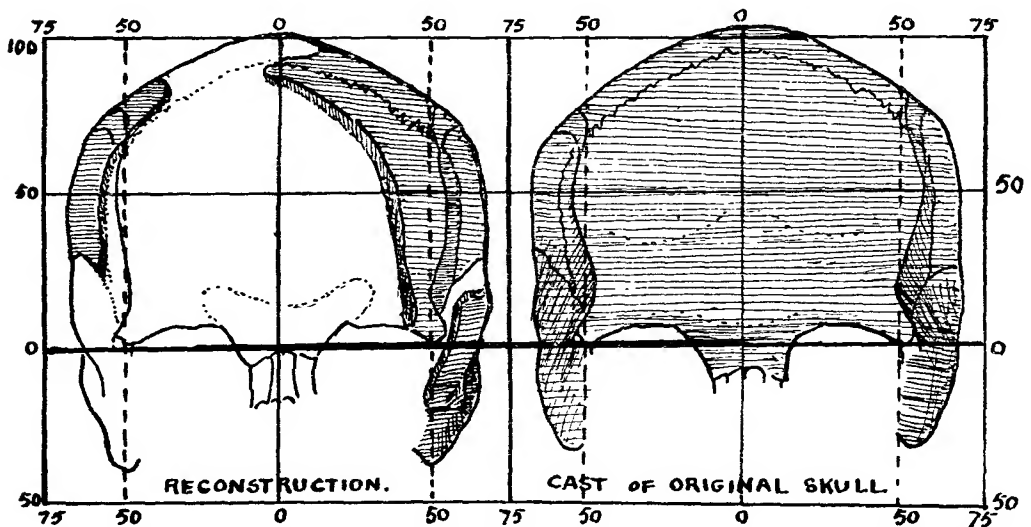


FIG. 12.—FRONTAL VIEW OF THE RECONSTRUCTED SKULL COMPARED WITH THE SAME VIEW OF THE ORIGINAL SKULL.

Mention has already been made as to the uncertain means at present at our disposal for determining the form of the forehead. As regards frontal width—the width between the temporal lines and between the external angular processes of the frontal—it will be seen that the reconstruction reproduces the original measurements with fidelity (Fig. 12). I was glad to see this part of my reconstruction confirmed, because the means at our disposal for determining the width of the forehead depend on three factors: (1) the right determination of the middle line along the vault; (2) the correct placing of the temporal bone, which gives us the width of the skull at the base; (3) the right placing of the occipital bone, which gives us the width of the skull behind. If these three factors are rightly appreciated, the width of the forehead follows as a matter of course. The forehead of the Piltdown skull appears to be remarkably wide—as measured between the temporal lines—while the external angular processes, although massive in form, are neither long nor prominent. The great width of the forehead is due to the thickness

of the bones and to the fact that the external angular processes occupy a less anterior position than in modern skulls. If we allow for the thickness of the bones of the Piltdown skull, the frontal width is really less than in the test skull.

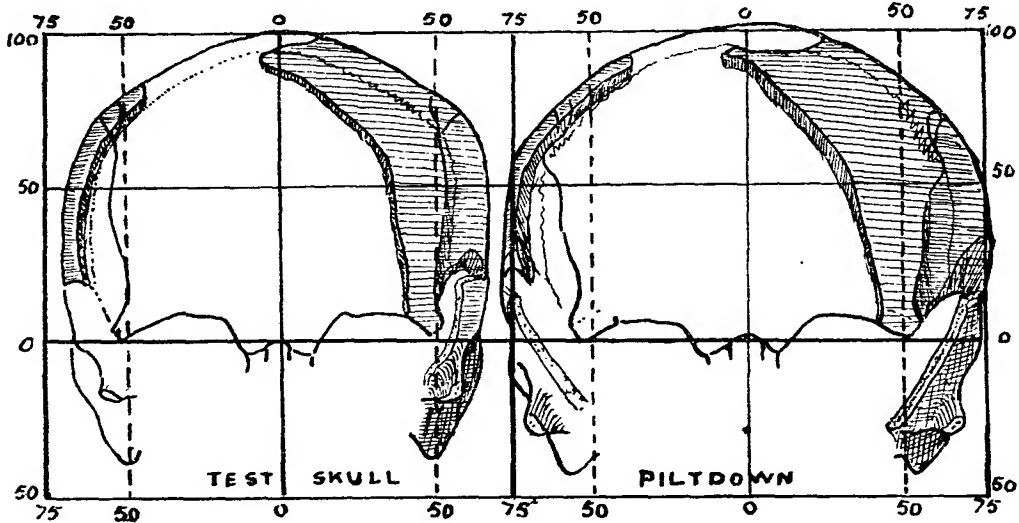


FIG. 13.—FRONTAL VIEW OF THE RECONSTRUCTION OF THE TEST SKULL COMPARED WITH THE AUTHOR'S RECONSTRUCTION OF THE PILTDOWN SKULL.

Having thus compared the various aspects of the reconstructed skull with the original, and shown that the problem to be solved is of the same nature as that which arises over the Piltdown skull, it is an easy matter to now summarize the method used in fitting the fragments together. The very first step, one which requires accuracy of drawing, is to discover the exact parts missing from the two parietal bones. There is only a part of the right parietal, but we have almost the whole of the left. By posing the two parietals in a similar position, one which is as near as possible to the natural position in the skull, an exact drawing of each is made. Then the drawing of the right bone is reversed and placed on the drawing of the left so that identical points are superimposed (Fig. 14).

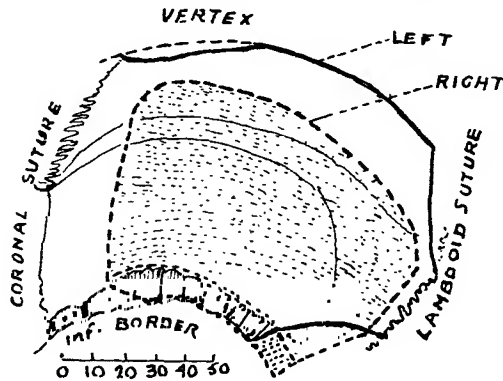


FIG. 14.—DRAWING OF THE RIGHT PARIETAL FRAGMENT SUPERIMPOSED ON THE LEFT, SO THAT IDENTICAL POINTS ARE IN CORRESPONDENCE. THE SECOND STEP CONSISTS IN SUPPLYING THE DEFICIENCIES OF THE LEFT PARIETAL, IN THE MANNER ALREADY DESCRIBED.

In the third step the left temporal bone is fitted to the left fronto-parietal fragment, in order that an approximate estimate may be made as to the width of the skull (*see* Fig. 15).

In the fourth step, the deficiency of the right parietal bone is made good—by the use of plasticine, modellers' wax, or clay. The manner in which the deficiency of the right parietal is restored is as follows:—The left fragment is oriented along the base line already described and placed on millimetre paper—the base line being indicated on the millimetre paper (Fig. 16). The lower border of the right parietal fragment is also placed on millimetre paper and similarly orientated (*see* Fig. 16). It is then an easy task to build up the right side so that it matches the left (*see* Fig. 16).

Having built up the two halves, they are then brought together to form the vault and sides of a skull. If the middle line has been correctly identified and

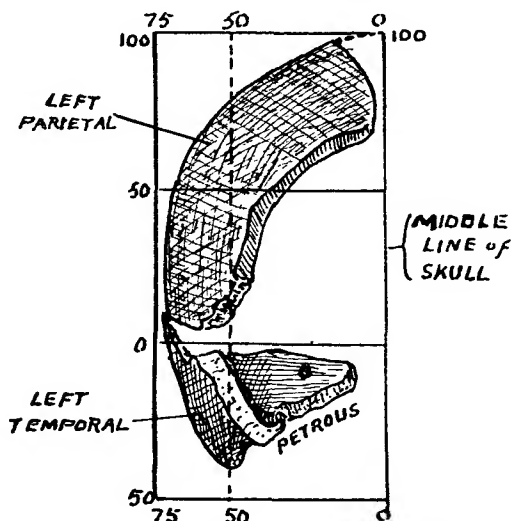


FIG. 15.—THE TEMPORAL BONE FITTED TO THE LEFT FRONTO-PARIETAL FRAGMENT TO GIVE AN APPROXIMATE ESTIMATE OF THE WIDTH.

the reconstruction of the two sides accurately carried out, it will be found, when the halves are placed in position, that the two sides of the parietal bones are symmetrical as regards position—just as the edges of a sheet of a newspaper correspond when the sheet is folded exactly along its middle line. If the two parietals do not match or correspond in position, a mistake has been made.

Having made good and applied the two halves of the vault, the next step concerns the temporal bone. The left one is articulated so that the apex of the petrous bone—if the apex is complete—lies 10 mm. from the middle line. The right parietal bone is built up out of a plastic material to match the left bone. At this stage the symmetry of the two sides has to be again examined. The final stage lies in the application of the occipital bone. If all the calculations involved up to this point have been correctly made, the occipital bone fits into its normal place. If a mistake has been made the occipital will not fit. The

application of the occipital is the final test that the reconstruction has been rightly carried out.

An address such as this is necessarily tedious. But the principles it deals with are wide-reaching, because if we admit that the accurate reconstruction of skulls from fragments is impossible we must also admit that the architecture of the skull lies outside the limits of true science. In my opinion the opposite is the

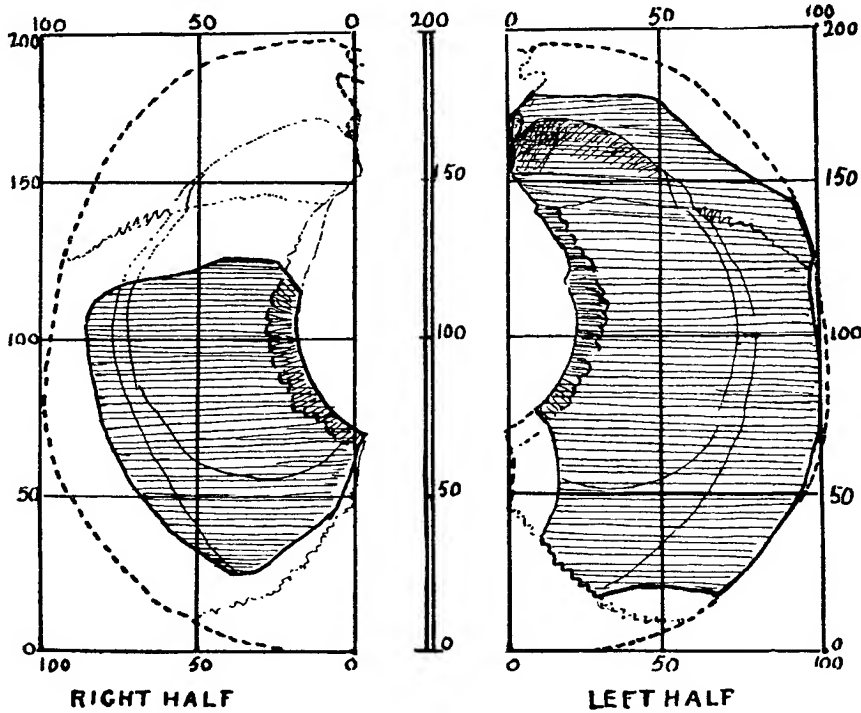


FIG. 16.—SHOWING THE MANNER IN WHICH THE RIGHT HALF OF THE SKULL IS BUILT UP FROM THE LEFT. THE LOWER BORDER OF EACH PARIETAL IS OPPOSED AND PLACED IN THE SAME POSITION AS REGARDS THE BASE LINE (0—0).

case: if we will but study and endeavour we shall discover that the skull is framed according to definite principles; that all its parts are correlated, and that it is possible from a part—if our knowledge is accurate and full—to reconstruct the whole. If this is not true, then our hope of obtaining a knowledge of extinct human forms is well-nigh hopeless, for we cannot expect to find complete fossil skulls. If the history of early man is to be built at all, it must be built out of fragments.

FRICTIONAL FIRE-MAKING WITH A FLEXIBLE SAWING-THONG.

BY HENRY BALFOUR.

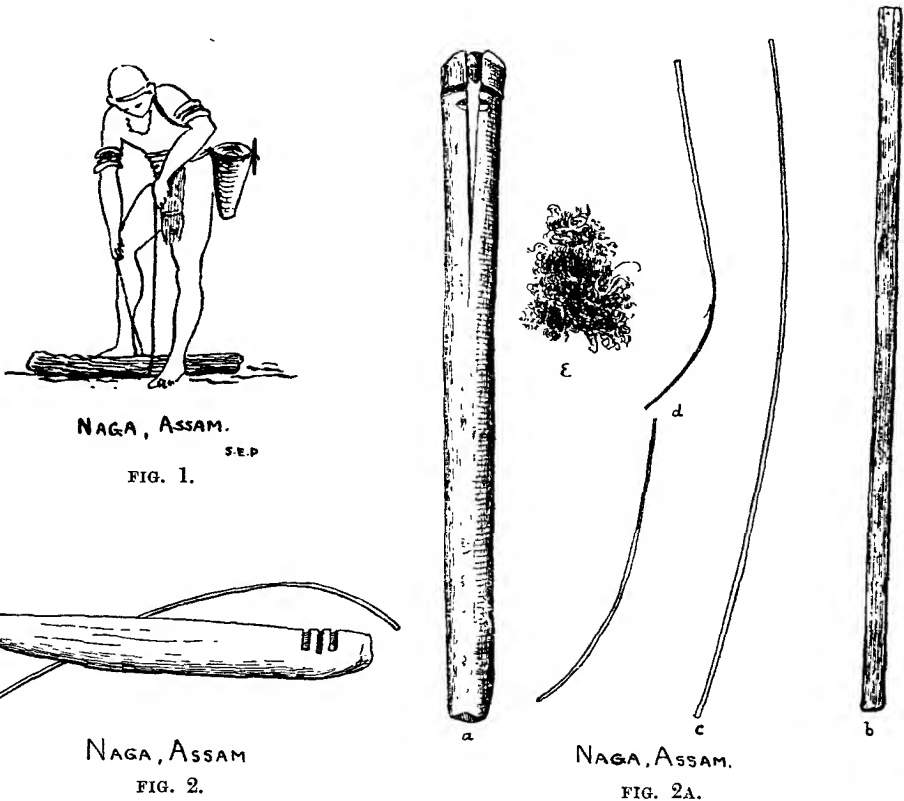
AMONG the various methods whereby fire is obtained by friction of wood, there is one whose varieties and geographical distribution have not hitherto been described with any degree of completeness, although its ethnological significance is an important one. I have, therefore, thought that it might prove of use if I were to bring together my notes on the subject, with a view to placing on record the wide range of this special method, as far as I have been able to trace it through a study of the literature and of specimens preserved in museums and private collections. I hope that the descriptions and the maps which I offer may be the means of eliciting further *data*, and that thus the complete geographical range of this fire-making appliance may become known.

The better-known frictional fire-making apparatus which involves the employment of a *rigid*, blade-like saw of bamboo or wood, is to be traced over an area which, to put it briefly, extends from India and Assam, though the Indo-Chinese region, the Malay Peninsula, and the Asiatic Archipelago, to Australia. It is also employed in the Nicobar Islands and in North America, and has been claimed for one district in Central Africa. In Europe, too, it has been used in various regions. I do not propose here to give a detailed description of its geographical dispersal, but merely refer to it as being a *sawing* method which is closely allied to the one under consideration, and whose geographical range coincides to a very great extent with that of the latter. In the East, at any rate, it seems probable that the *flexible* saw, as applied to fire-making, is merely an interesting variant of the *rigid* saw, and that these two methods have one common origin.

The essential difference between these two "sawing" methods is to be seen in the "saw" itself, which in the one is a rigid blade or stick, and in the other is a flexible band or thong. In nearly all cases where the flexible saw is employed, the procedure is essentially the same. A stout piece of bamboo or wood is held in position, and a narrow thong of cane or other suitable material is looped round it, the friction being caused by pulling the ends of the thong alternately, so that it is sawn across the stick or post, detaching in the process a fine wood-powder and generating by the friction sufficient heat to ignite the powder and cause it to smoulder. From the smouldering dust a flame can readily be obtained with the help of some quickly inflammable material, such as dry grass, etc. The details and accessories of the process are referred to in the various local descriptions which I

quote below in the order of their geographical dispersal, which, as far as I have hitherto ascertained, is as follows:—

NAGA HILLS, ASSAM.—The north-westerly extremity of the main area of geographical range of the practice of fire-making with the flexible saw is to be found amongst the NAGAS of the Naga Hills, who adopt this method, at any rate locally. Reference to this region was given by the late Mr. S. E. Peal, formerly resident in Sibsagar, who wrote¹ that fire was obtained by the Nagas (or Nogas, as he preferred to call them) “by means of a long piece of cane passed under a dry log and pulled (*i.e.*, the ends) alternately by the right and left hand, so as to ignite some tinder placed in a hollow or split underneath” (see Fig. 1).



In the Ethnological Museum at Berlin I saw a Naga fire-making apparatus of this kind (Fig. 2), the native names for the various parts being given as follows, *yung* = the cane strip, *miset* = the wooden stick, *renra* = the tinder.

I have also just received, through the kindness of Mr. J. H. Hutton, a complete fire-making set from the Naga Hills, consisting (Fig. 2A) of a billet of lime wood, split at one end and wedged open with a stone. The thong is a narrow sliver split from a piece of bamboo and whittled smooth, the shavings from this supplying the tinder, which is placed under the fork. The billet is held down on the ground

¹ *Journ. Anthropol. Inst.*, xxii, 1893, p. 252, and Plate XVIII.

with the foot, and the thong is sawn round it in the usual way. Almost any wood may be used but lime is preferred.

CHITTAGONG HILLS.—Captain T. H. Lewin¹ describes in detail this method as practised by the TIPPERAH tribe of the Chittagong hill-tracts. "They take a piece of dry bamboo about a foot long, split it in half, and on its outer round surface cut a nick or notch, about $\frac{1}{8}$ th inch broad, circling round the semi-circumference of the bamboo, shallow towards the edges, but, deepening in the centre, until a minute slit about a line in breadth pierces the inner surface of the bamboo fire-stick. Then a flexible strip of bamboo is taken, about $1\frac{1}{2}$ feet long and $\frac{1}{8}$ th inch in breadth, to fit the circling notch or groove in the fire-stick. This slip or band is rubbed with fine, dry sand, and then passed round the fire-stick, on which the operator stands, a foot on either end. Then the slip, grasped firmly, an end in each hand, is pulled steadily back and forth, increasing gradually in pressure and velocity as the smoke comes. By the time the fire-band snaps with the friction, there ought to appear through the slit in the fire-stick some incandescent dust, and this, placed smouldering as it is in a nest of dry bamboo shavings, can be gently blown into a flame."

ANNAM.—Away to the eastward, the same process of making fire is adopted by the MOIS, a primitive people inhabiting the table-land and mountains between the Mekong River and the Annam coast, from the frontiers of Yunnan to Cochin-China. They are probably of Indonesian stock. The process is almost identical with that followed by the Tipperahs. According to M. A. Gauthier,² half of a split bamboo is notched on the convex surface and is held down by the feet. Strips of green bamboo-rind are split off, *c.* 8 mm. thick and 50 cm. long. To each end a little wooden toggle is fixed. About 100 of these strips are usually prepared at a time. Fire is obtained only after expending some 30–40 strips which break after seven or eight sawing movements. The method is not common, as slow-matches are usually carried, and the Mois also employ the fire-piston.³

MALAY PENINSULA.—In this region, the SAKAI, SEMANG and MALAYS all employ this method. W. Skeat and C. Blagden⁴ mention that it is a common method among both the Western, or Kedah Semang, and the Eastern Semang, or Pangan, who use a rattan thong and a dried branch (of certain special trees only) which is held down with the feet.

T. N. Annandale and H. C. Robinson⁵ give a full description of the process as witnessed by them in Grit in the Upper Perak district, where the older men still resort to it in place of more modern methods. They describe how a SEMANG chief "took a billet of soft wood, about $1\frac{1}{2}$ feet long, and split it at one end so as to form a cleft of about 6 inches. Into this he inserted a small stick, which

¹ *The Wild Races of S.E. India*, 1870, pp. 207, 208.

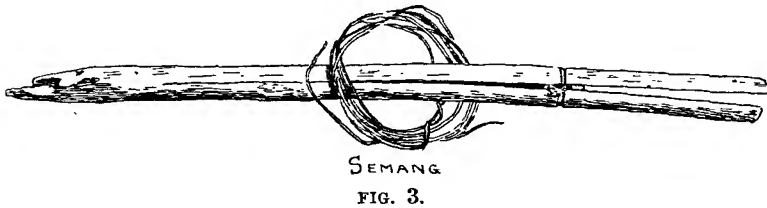
² *Bull. Soc. Geog. du Havre*, xiv, 1901, p. 95.

³ v. H. Balfour, "The Fire-piston," in *Anthropological Essays presented to Edward Burnett Tylor*, Oxford, 1907, p. 27.

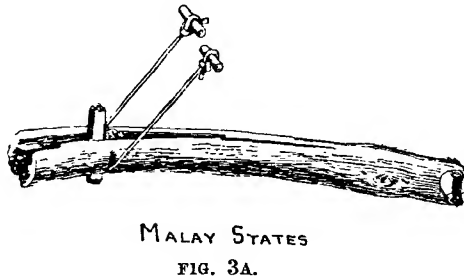
⁴ *Pagan Races of the Malay Peninsula*, 1906, i, p. 114.

⁵ "Fasciculi Malayenses," *Anthrop.*, pt. i, 1903, p. 15.

formed a peg separating the two halves and standing above the surface of the billet to the height of an inch or more. Beside this he placed some 'palm-scurf.' He then took a stout strip of rattan, about 5 feet long, and passed one end of it under the billet as it lay on the ground. To each end he fastened a stick, which acted as a handle (*cf.* the Mois above). Then he grasped one of these sticks in each hand, and, holding down the cleft billet by means of his right foot, he began to draw the rattan backwards and forwards across the inner surface of the billet. He grasped the peg which kept the cleft open between the great and second toe. The friction caused by the rattan rubbing against the soft wood soon produced a considerable amount of heat, which first blackened the wood and then caused the tinder to take fire. Lifting up the billet, the man had no difficulty in lighting a cigarette at the palm-scurf, which was now smouldering in the cleft." A specimen of this apparatus from Upper Perak is shown in Fig. 3.



In the British Museum there is a fire-making set from the Semang of Grit, with a sawing-thong of bamboo strip, the ends of which are fitted with small wooden toggles (Fig. 3A), as described above in connection with the Semang fire-saw and also with that of the Mois.¹



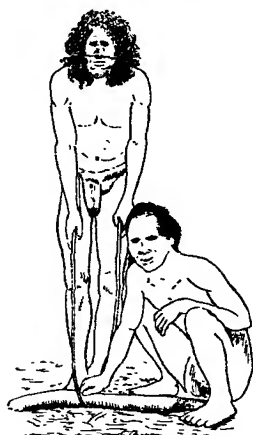
The same authors² describe a similar process among the MAI DARÁT (SAKAI) of the Batang Padang district of Southern Perak. The actual procedure differed slightly from that seen among the Semang, as the wooden billet was not split and no peg was inserted. The tinder was held near the groove formed by the rattan thong. "The ends of the rattan were held by a man sitting on the ground, and the same man shoved against the billet of wood with his right foot, thus keeping it pressed hard against the rattan, which he drew backwards and forwards round it.

¹ *Handbook to the Ethnographical Collections*, 1910, Fig. 7c.

² "Fasciculi Malayenses," *Anthrop.*, pt. i, 1903, p. 14.

This method is considered most efficient if suitable materials could be obtained ; but very strong rattan was necessary, as well as peculiarly soft wood." Alternative methods with the Mai Darát are fire-making with the stiff bamboo saw or with the thong-drill. A specimen from the Mai Darát is in the British Museum.

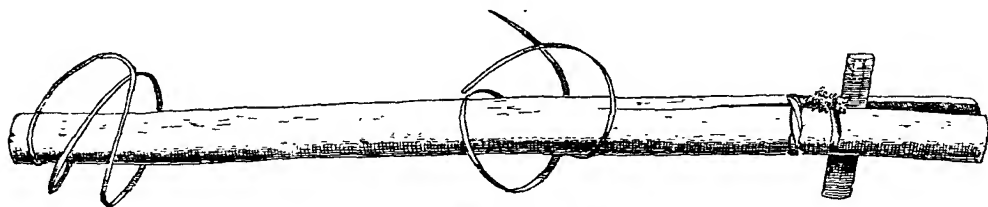
Captain G. B. Cerruti¹ gives a somewhat different version of the process as seen by him among the SAKAI. "A bamboo reed is taken and a small hole is made in it, into which is introduced the tinder, a downy substance found at the base of palm-leaves and known by the name of *lulup* among the Malays. Round the bamboo is wound two or three times a long strip of very flexible rattan. The operator holds in his hands the two ends of the rattan, and, pressing firmly upon the bamboo with his feet, commences to pull first one end and then the other,



SAKAI.
FIG. 4.

forcibly and with great rapidity" (Fig. 4). Leaves of dry grass are thrown on to the tinder when this has become ignited. The way in which the smoke of the resultant fire behaves is observed and is used for divining whether a selected site for a new habitation is auspicious or not. I must confess to feeling some doubt as to the cane thong being "wound two or three times" round the bamboo, since it is likely that the friction would be too great to admit of rapid sawing, and to pass the cane thong more than *once* round is contrary to the practice of other peoples who employ this method.

The MALAYS of the Peninsula are mentioned by Nelson Annandale and by Leonard Wray as employing at times the flexible-saw apparatus for fire-making, though ordinarily other more modern methods are available. A specimen of the Malayan apparatus (Fig. 5) was sent to me in 1892 by Mr. Leonard Wray, and is now in the Pitt Rivers Museum. It is practically similar to the Semang apparatus



MALAY, PERAK.
FIG. 5.

(Fig. 3) and consists of a stout stick of very soft, white wood, split at one end and with a wooden plug inserted in the cleft, to keep the two halves apart, a collar of rattan preventing the slit from extending. Tinder formed of bamboo shreds is inserted in the cleft at the point where the sawing takes place. The saw is a long

¹ *Nel Paese dei Veleni*, 1906, p. 161 ; and in the translated version, *My Friends the Savages*, 1908, p. 146.

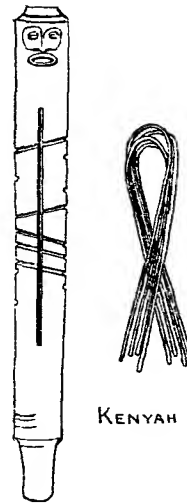
and flexible cane thong. In using the apparatus, the Malay sets the stick vertically against a tree, fixing the upper end by binding a cane strip round it and the tree (Fig. 6). The lower end is steadied with the foot, and the ends of the cane thong which is passed round the stick at the spot where the tinder is, are alternately pulled horizontally.

BORNEO.—Passing eastward, as I have no reference to the occurrence of this method in Sumatra, the next region to be noted is Sarawak and the adjacent parts of British North Borneo and Central Borneo, where it is employed nowadays ceremonially by the KAYANS and KENYAHs, especially by the former. W. H. Furness¹ describes the ceremonies observed in connection with the naming of a child at the house of Tama Bulan, a Kenyah chief, living about 400 miles inland on the Pata River, a tributary of the Baram. New-fire had to be procured by friction. He says, "The Musa consists of a piece of soft fibrous wood, which is



MALAY, PERAK

FIG. 6.



KENYAH

FIG. 7.

held down by the feet, firmly on the ground, and rests upon a bundle of fine slivers of dry wood; underneath it is passed a strip of dry but flexible bamboo, which is sawed back and forth until the friction starts a spark in the fine dust which has been thereby rubbed up; the spark is fostered and soon blown into a flame in the bundle of slivers. When the materials are in proper condition, fire can be produced in much less than a minute. Should all the fires in a house go out, or when fire is to be started for the first time in a new house, the Musa is the only method whereby fire may be kindled,—no flint and steel, nor fire-drill, nor fire-syringe, nor matches (common enough, thanks to the Chinese bazaar), can be used; it must be the Musa, and the Musa alone. At the naming of a child, the piece of soft wood is carved into a grotesque head at one end. The image thus made is called 'Laki Pesong,' the god of the Musa." In Fig. 7 I reproduce this author's

¹ *Home Life of the Borneo Head-hunters*, 1902, p. 37.

figure of the apparatus. It will be noted that in this example, the stick is not split at one end, but a narrow longitudinal slit is cut through it and answers the same purpose as a cleft. A number of the bamboo strips are shown. Mr. Furness also refers to the Musa in *Folk Lore in Borneo*¹ and mentions that it is also employed when consulting the omen birds. It appears that divination is also practised in conjunction with the production of new-fire at a child-naming, since, if the cane saw, at the moment when the spark is obtained, breaks in even lengths, the omen is regarded as unlucky and a new name must be chosen, whereas if the two pieces are of unequal size, the omen is auspicious and the name is a good one.

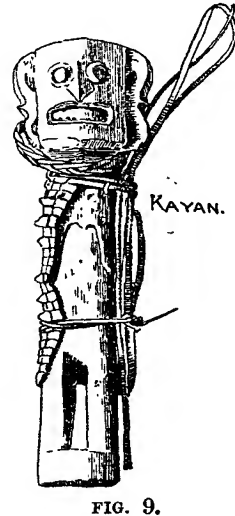
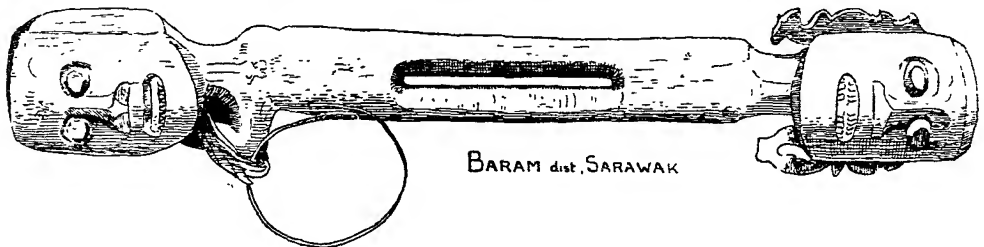


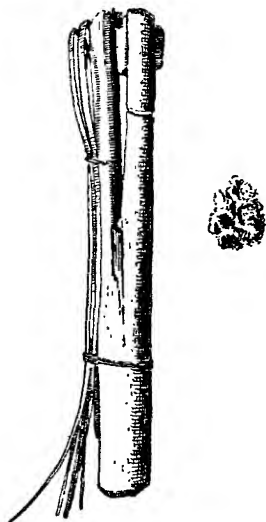
Fig. 8, taken from a photograph given me by the late R. Shelford, shows a Kayan making fire in the manner described. Figs. 9, 10 and 11 are from specimens collected by Mr. C. Hose in 1904 and 1906 from the Kayans of the Barain district, Sarawak, and were made for use during the child-naming ceremony. One specimen (Fig. 9) is completely anthropomorphic. Fire has been obtained by sawing the



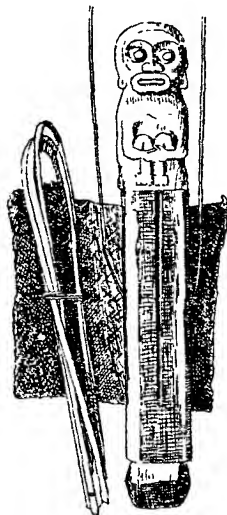
cane thong round *one* of the legs of the figure, and not across the slot which separates the legs. Mr. Hose states that the figure represents Laki Pesong, the god of fire, to whom Kayans pray for long life for a child, and he adds that the

¹ 1899, pp. 8, 10 and 24.

carved wooden piece is called *pesong*, the cane thong *pusa*. The second specimen (Fig. 10) is also anthropomorphic, the head of Laki Pesong being carved at each end, the longitudinal slot at the centre representing in a conventional manner the fused legs of the two figures. The third example (Fig. 11) is not carved, but one end is split, the cleft being wedged open with a piece of wood. As in the example shown in Fig. 9, the fire groove appears on one limb only of the fork, and does not extend across the cleft. Some palm-scurf tinder accompanies this specimen. A similar apparatus is in the British Museum. Hose and McDougall¹ describe and figure another example of the Kayan apparatus (Fig. 12) in which Laki Pesong



KAYAN.
FIG. 11.



KAYAN
FIG. 12.

is represented as a squatting figure, carved at one end. "For each child who is to be named a small human image in soft wood is prepared. This is an effigy of Laki Pesong, the god whose special function it is to care for the welfare of the children. A small mat [shown in Fig. 12 and also in Fig. 9] is woven and a few strips of rattan provided for each child. Each child sits with his (or her) mother in the gallery beside the door of their room, and the parents announce the name they propose for the child. Then the father, or some other man, after killing a chick or young pig, lays the image on the mat before the child, passing one of the rattan strips beneath it, and, holding the image firmly with a big toe on each end of it, pulls the strip rapidly to and fro, until it is made hot by its friction against the image, and smoke begins to rise." The cane thong breaks eventually and the auspiciousness or inauspiciousness of the suggested name is divined according to whether the two pieces are of unequal or of equal length. If the latter occurs, another name is suggested and is submitted to the same test. The name *pusa* appears to be applied to the whole apparatus and also to the ceremony.

¹ *The Pagan Tribes of Borneo*, 1912, ii, p. 160, and Plate 168, Fig. 2.

Dr. A. W. Nieuwenhuis¹ figures a specimen obtained from the Kayans of Central (Dutch) Borneo, a sketch from his photograph being reproduced in Fig. 13. This specimen is almost identical with that shown in Fig. 11, the stick, however,

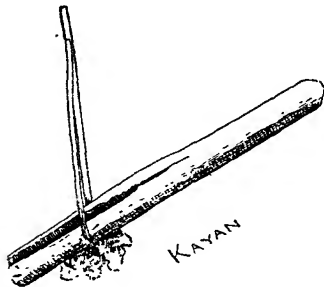


FIG. 13.

being merely split for half its length, the "limbs" retaining their rough edges,

instead of being rounded off as in the latter example. Also, if we can judge from Dr. Nieuwenhuis' photograph, the "saw" passes round *both* limbs, instead of round one only, as in the more specialized, anthropomorphic apparatus of the Kayans. Since in the other regions where this method of fire-production obtains, the band almost invariably passes round both "limbs" of the stick, when this is split and wedged open, we may regard this example as representing the more *primitive* type in Borneo, and it seems likely that the anthropomorphic association

in this island was first suggested by the bifurcation of the stick, which simulated body and legs, the human resemblance being improved upon subsequently. This involved incidentally a shaping and rounding of the legs of the figure, and, the rough edges having been eliminated, it was probably found that the requisite friction was more readily produced by sawing round one of the rounded limbs than by sawing round both, and also that the little pile of friction-dust became concentrated upon smaller space, enabling it to accumulate the heat quicker. We may, I think, account in this manner for what appears to be a departure from the normal procedure.

This method appears nowadays to be restricted in Borneo to purely ceremonial use. For domestic purposes alternative methods of fire-production, associated with various tribes, are the rigid fire-saw, the hand fire-drill, percussion with bamboo and crock, flint-and-steel, the fire-piston, and, recently, imported matches.

PHILIPPINE ISLANDS.—In the Philippine group the thong-saw is again met with among the Negritos of Casiguran, N.-E. Luzon, whose apparatus was collected by Dr. Semper and has been described and figured by Dr. A. B. Meyer.² It consists (Fig. 14) of a stick, 32 cm. long, split for two-thirds of its length, the two parts being wedged apart with a piece of wood, some white bark-cloth serving as tinder, and a long strip of rattan, *bejuco*, about a metre long, serving as a saw. The bark-cloth is fixed in the cleft of the stick and the rattan thong is sawn round both limbs of the fork in the usual manner. The specimens are in the Dresden Museum.

The Mangyans of the Bakó district of Mindoro Island (which lies between

¹ *In Central Borneo*, 1900, i, Plate XIX.

² *Die Philippinen*, publication of the Royal Museum, Dresden, No. ix, 1893, Plate II, Fig. 7, and p. 5.

Luzon and Palawan), also make fire with the rattan thong-saw. Mr. M. L. Miller writes of them as follows: "In the Bakó region practically every man met with, and some women as well, wears on the left upper arm 1 or 2 or 3 armlets of rattan. These appear ornamental, but are used in making fire. A piece of dry wood about 3 cm. in diameter is selected, one end of it is split for a distance of 12 or 14 cm. and a plug is put in to keep the slit open. A few shavings are then put tightly into the slit where it is narrow. One of the armlets is taken from the arm, unwound, and passed round the split stick just under the shavings. The split stick is held firmly on the ground with the two feet, and the rattan is drawn rapidly backward and forward until the shavings ignite. A few seconds are sufficient." Mr. Miller has traced Negritic affinities in this district of Mindoro, and it is probable that there formerly existed a Negrito population in this island.

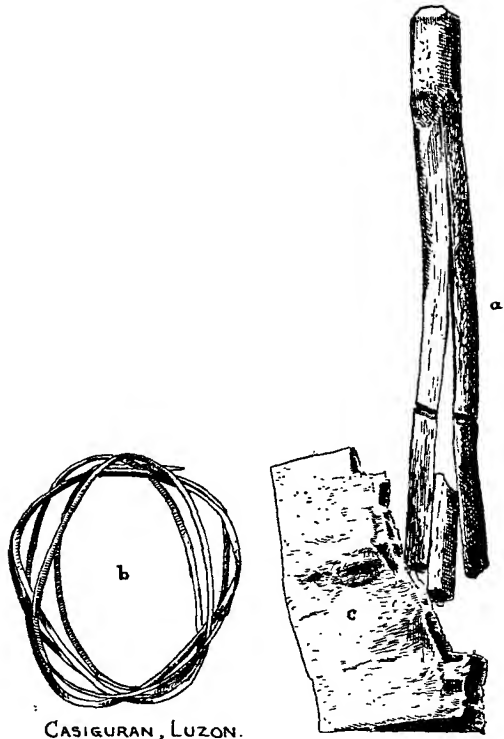
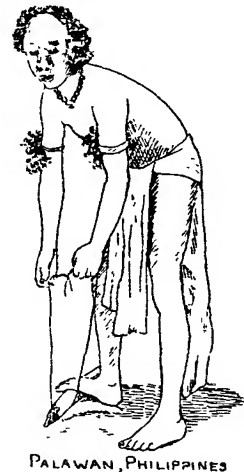


FIG. 14.

A photograph by Mrs. F. Cooper Cole showing a "pygmy" of the Island of Palawan making fire, is reproduced in *The Customs of the World*.¹ A sketch from this photograph is given in Fig. 15. The stick in this instance does not appear to be split. Although described as being a "pygmy," it is not certain that the native represented is a Negrito, though it is probable that he is at any rate partially Negritic. The Island of Palawan forms a geographical link between N.-E. Borneo and Luzon.

NEW GUINEA.—We next meet with this apparatus in the Island of New Guinea, where its distribution covers a wide area, which extends into the Dutch, British and German territories.

In Dutch New Guinea the most westerly district from which I have a record of the use of the flexible-saw is that of the upper waters of the Mimika River, where it was observed by the members of the recent expedition organized by the British Ornithologists' Union, 1910-1911, among the

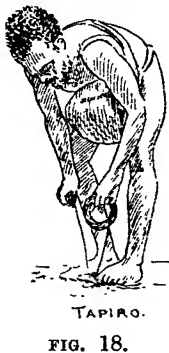
PALAWAN, PHILIPPINES
FIG. 15.

¹ 1913, p. 657.

TAPIRO pygmies of the lower slopes of the mountain range, *c.* $4^{\circ} 13' \text{ S.}$, $136^{\circ} 43' \text{ E.}$ Mr. A. F. R. Wollaston has given a full description of the process.¹ He also very kindly gave me two sets of the apparatus, and a third set to the Pitt Rivers Museum. Two of these are seen in Figs. 16 and 17. As will be seen, the stick,



which is quite short in all the examples, is as usual split, the cleft having a small stone inserted so as to keep it open. The example shown in Fig. 16 is split for about three-quarters of its length; the other (Fig. 17) is split right through, but the lower end is kept closed by means of a binding-collar. The thong-saw is a very long strip of rattan, which is kept neatly coiled up in a thick ring. The tinder is usually a piece of the fibrous sheath of a palm-shoot, or a piece of dry moss. The tinder is placed in the narrow part of the cleft, behind the stone. The operator places the stick on the ground, holding it down with one foot. "Then, having unwound about a yard of the rattan, he holds the coil in one hand and the free end in the other, and looping the middle of it underneath the stick at the point where the tinder is placed, he proceeds to saw it backwards and forwards with extreme rapidity (see Fig. 18). In a short space of time, varying from ten to thirty seconds, the rattan snaps and he picks up the stick with the tinder, which has probably by this time begun to smoulder and blows it into a flame." The thong passes round both limbs of the forked stick. Both the specimens figured have been much used and show numerous charred grooves, each of which indicates where a "sawing" has been performed. The fire-saw is most frequently used for lighting tobacco. The Tapiro showed no signs of surprise at the Englishmen's matches, and did not wish to



¹ *Pygmies and Papuans*, 1912, pp. 200, 201, 202.

possess them, preferring their own primitive contrivance, which they use with such skill and rapidity.

Captain C. G. Rawling,¹ another member of the expedition, also refers to fire-making among the Tapiro, and gives three illustrations of the process.

Mr. Wollaston, during the more recent and very successful expedition to Dutch New Guinea in 1913, again observed this method among the hill people, of supposed Negritic stock, on the slopes of Mount Carstensz, *c.* 137° 12' E., 4° 10' S., living at an elevation of between 4,000 and 6,000 feet. I am much indebted to him for giving me particulars in a letter. The practice in this district, which lies somewhat to the east of the region occupied by the Tapiro, is almost identical with that of the latter tribe, only "whereas the Tapiro carry the thong in a long strip twisted into a ring, the Carstensz people carry it, cut into short lengths, each one sufficient for one operation only. They are carried folded in U-shape, tied together in a bundle of a dozen or so . . . They secure the stick with *both* feet, while the Tapiro hold it down with *one* foot only, but this may be only a chance . . . This method is not used by the people of the coast."²

It is important to note that fire-making with a pliant cane-saw is restricted in Southern Dutch New Guinea to the hill people, who are either true pygmies, or at any rate are largely of Negritic origin. The Papuans of the Mimika River and Parimau district, as also those of the coastal plains further eastward, do not employ this method of procedure.

Further eastward, again, a record of this fire-making method is furnished by Dr. H. A. Lorentz,³ who, during his successful attack upon Wilhelmina Peak, 1907-1909, observed it among the hill natives of the Treub Mountains, on the headwaters of the Lorentz River (Noord River), *c.* 4° 24' S., 138° 42' E. He does not describe the process, but merely says "we learnt how by friction of rotan one can make fire." While Dr. Lorentz states that he did not meet any pygmies, he differentiates between the mountain Papuans and those of the plains, saying that the former "are not so large as the people of the Lorentz (north) River." Thus, it is very possible that there may be traceable some Negritic element in the highlands, which would suggest an affinity between these people and the Tapiro, whose method of fire-production is the same.

On the southern slopes of Mount Goliath, 4° 43' S., 139° 51' E., drained by the Eilanden River, Army-Surgeon A. C. de Kock saw natives of Negritic affinity who procured fire after the manner of the Tapiro. Two pieces of wood, about 15 cm. long, were bound together so as to enclose a wedge-shaped space at one end, into which tinder from the leaf-sheath of *Caryota Rumphiana* was inserted. A slender strip of rattan was passed under the forked wood and drawn to and fro.⁴

¹ *The Land of the New Guinea Pygmies*, 1913, pp. 111 and 273.

² See also *The Geographical Journal*, xliii, 1914, p. 262.

³ *The Geographical Journal*, xxxvii, 1911, p. 489.

⁴ Van dem Broek in *Zeit. f. Ethnologie*, 1913, p. 28.

Continuing eastward, the boundary-line between Dutch and British New Guinea must be crossed before we again meet with the flexible fire-saw. It was recorded by L. M. D'Albertis¹ in 1876, on the head-waters of the Fly River, above the junction with the Alice River, and near the lower slopes of the Victor Emanuel Range. He says, "I observed some round logs of wood, probably the trunks of small trees—which bore spiral marks of fire. On examination I ascertained that with these the natives are accustomed to kindle their fires. A piece of rattan about two feet long, and split in two for about half way its length, used like a rope round a drill, causes the wood to take fire by its friction." There evidently has been some slight confusion in writing up his field-notes, and we may assume that the words "split in two for about half way its length," applied by him to the cane thong, should rather refer to the log. The partial splitting of the thong seems to be unnecessary, whereas, as has been seen, it is a very usual procedure in other regions in preparing the log or stick for this purpose. Moreover, D'Albertis himself figures² a fire-stick (though, unfortunately, without any *data* in the text) which is clearly split at one end, and exhibits two transverse grooves across the cleft, evidently produced by sawing-friction (Fig. 19).



UPPER FLY R., NEW GUINEA

FIG. 19.

At the mouth of the Fly River this apparatus was observed by the Rev. J. Chalmers in the Island of KIWAÏ.³ He gives no details, merely saying that fire is sometimes obtained "by a length of cane drawn swiftly across a piece of wood held down by the foot: the ends of the cane are held in both hands as among the Koiari at the back of Port Moresby." An alternative method of fire-making in Kiwai is the "ploughing" method. The Kiwaians appear to be true Papuans, though the statements as regards their stature vary somewhat, and it is possible that some may show a *slight* admixture of Negritic blood.

A little further eastward and again inland in the mountain region, the Hon. M. Staniforth Smith discovered the flexible fire-saw among the Bush-natives of the SAMBREGI tribes, a little to the N.W. of Mount MURRAY, living at an altitude of about 6,000 feet above sea level, *c.* 143° 50' E., 6° 40' S.⁴ "Their method of making fire is superior to the usual Papuan system. They get a piece of dry soft wood, split one end and insert a piece of tapa cloth, then taking a piece of cane, which they carry twisted round their waists, they place it under the wood on

¹ *New Guinea*, 1880, ii, p. 99.

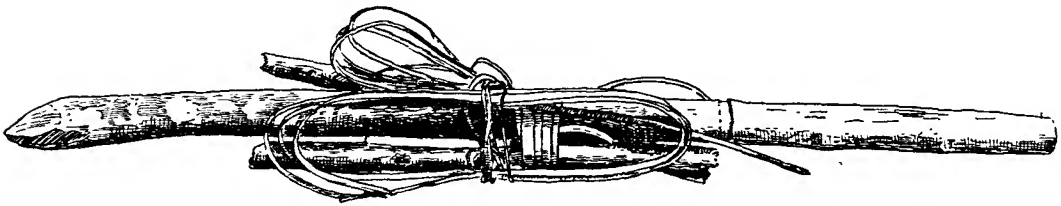
² *Loc. cit.*, p. 378, Fig. 2.

³ *Journ. Anthropol. Soc.*, xxxiii, 1903, p. 118.

⁴ *Geographical Journal*, xxxix, 1912, p. 327, and *Annual Report, British New Guinea*, 1911, p. 169.

which they stand. Grasping each an end of the cane, they pull it backwards and forwards vigorously; when it has eaten half way through the wood to the tapa cloth the heat generated is so great that the cloth smoulders and is blown into a flame. The whole process is accomplished in ten or fifteen seconds. I am informed that certain natives on the main range about Kagi adopt this system also; if so, it is interesting as possibly showing some connection between them." He describes the physique of the Sambregi people as magnificent, and it is unlikely that there is any marked infusion of Negrito blood among them, although the physique is described as not being uniform. It is suggested that there may be some mingling of Papuans and Papuo-Melanesians in this district.

The next locality of which I have record is the district of the Purari Delta, where the MAIPUA tribe is of Papuan stock. I have two sets of the apparatus, *karo karo*, from this tribe in my collection, and one which is shown in Fig. 20 is in the



MAIPUA, PURARI DELTA, NEW GUINEA.

FIG. 20.

Pitt Rivers Museum. I purchased all three together in 1899. Each set consists of one or two long and fairly stout staves or fire-sticks of very light wood resembling Hibiscus, and a bundle of strips of cane in fairly long lengths; two of the sets have in addition a coil or two coils of cane-strip. Also each set has two long wooden pegs, roughly pointed at one end, as though for fixing in the ground to hold down one end of the fire-stick. The fire-sticks are not split, but are pointed at one end. No details as to the precise methods pursued in using the apparatus accompanied the specimens, but we may, perhaps, infer that the pointed end of the fire-sticks is driven into the ground diagonally, the other end of the stick being held in position by the two pegs which are also forced into the ground in such a way as to cross one another above the stick. One of the cane-thongs would then be passed under the stick and the ends pulled alternately as usual. One of the fire-sticks exhibits a longitudinal groove on one side, evidently produced by fire-making by the "ploughing" method, which appears from this to be an alternative method, perhaps derived from contact with Papuo-Melanesian culture, the influence of which extends westwards as far as Cape Possession at least, and may well have reached the strictly Papuan tribes still further to the westward. We know of the "ploughing" method of fire-making in other parts of the Papuan Gulf, extending as far west as Kiwai Island at the mouth of the Fly River.

We next meet with the flexible fire-saw in a group of localities to the west of the extended Owen Stanley Range, in a region where the western Papuo-

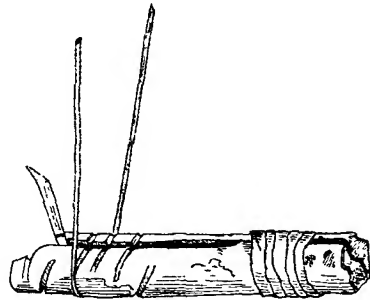
Melanesian stock is more or less in direct contact with the pure Papuan, and where Negritic affinities have already been traced in certain districts and seem likely to be noticed over a wider area when the various tribes have been subjected to more critical investigation. The Rev. Father V. M. Egidi¹ has described and figured the process among the KUNI tribe (Kovio group) of Dilava, in the mountains behind Mekeo, *c.* 8° 33' S., 146° 52' E. These people speak a Melanesian language, though this is probably not a safe guide to the racial affinities of this short, dark, frizzly-haired people.

The Kuni usually keep their fires burning, and guard them jealously, and when travelling, carry a smouldering piece of soft wood or of bark-cloth; but when fire has to be obtained, dry leaves are laid upon the ground, and over these some old bark-cloth, to catch the spark caused by sawing a cane strip round a stick held upon the ground by the feet, until the cane breaks (Fig. 21). The operation of



KUNI, DILAVA, N GUINEA

FIG. 21.



KAMBISA, CHIRIMA VALLEY, N GUINEA

FIG. 22.

fire-making is called *vinè-jaka*, *i.e.*, to pull the cane thong (*vinè*); the fire-stick is called *aukapa*. These names are only used when these materials are employed for fire-making, *au* and *valo* being the ordinary names for the wood and the cane.

To the east of Dilava and on the south-east slopes of Mount Albert Edward, in the valley of the Chirima (a tributary of the Mambare River), lie the KAMBISA villages at an altitude of about 6,000 feet, *c.* 147° 30' E., 8° 35' S. In this district Mr. C. A. W. Monckton in 1906 met with a people of short stature, allied, apparently, to the Kovio group, and therefore to the Kuni. Their system of fire-making is, like that of the latter tribe, by means of the flexible thong-saw. A piece of dry wood is split in two, the two parts being bound together with bark strips towards one end (*cf.* Fig. 17), and forced apart with a bamboo peg towards the other end. This piece of wood is held down with the foot. A bamboo sawing-thong is passed underneath and round both limbs of the split billet, the ends being alternately pulled, the spark is caught in tinder lodged at the point of friction² (Fig. 22). It is to be noted that between the Kuni and the Kambisa tribes lie the

¹ *Anthropos*, ii, p. 108.

² C. A. W. Monckton, *Annual Report, Brit. New Guinea*, 1907, Plate accompanying Report No. 108.

Mafulu, recently studied by Mr. R. W. Williamson, whose researches have revealed a very strong Negritic strain in this section of the Fuyuge-speaking people. Mr. Williamson and others think it probable that this Negritic element is traceable over a wide area of the mountain region in this part of New Guinea, and the short stature of the Kuni and Kambisa tribes, to take one characteristic only, would lend colour to the belief that these people also show pygmy affinities.



OWEN STANLEY RANGE, N. GUINEA

FIG. 22A.

A fire-stick from the Owen Stanley Range (exact locality not specified), now in Mr. E. Bidwell's collection, is shown in Fig. 22A. The stick is, as usual, split at one end and wedged open with a peg. It has been sawn once with a strip of rattan about 6 mm. in diameter. I am indebted to Mr. Bidwell for particulars and sketches.

At KAGI, on the western spurs of the Owen Stanley Range, under Mount Kaneve, *c.* 147° 40' E., 9° 10' S., and at an elevation of 4,000 to 5,000 feet, fire is made with the same apparatus, according to Colonel Kenneth Mackay.¹ "They make fire by passing a length of cane under a partly split piece of soft stick (the cleft being held open by a pebble), and draw it quickly up and down where the wood rests on some dry mulberry leaves. In response to the friction, smoke begins to rise in three or four minutes." Mr. Staniforth Smith (*op. cit.*) has drawn attention to the similarity in physique observable between the Kagi people and the Sambregi of Mount Murray, who also practise this method of fire production.

In the neighbourhood of Kagi, *i.e.*, on the upper waters of the Naoro or Brown River and on the slopes of the main range, this process was observed by Dr. H. O. Forbes at Uburukara, situated on Mount Archer, which is due south of Mount Owen Stanley, *c.* 147° 32' E., 9° 0' S.² He says, "Most of the men wore on their arms, or hanging in their girdles behind, coils of rattan rope, which are used by them for 'making fires.' For this purpose the operator, first selecting a dry fragment of wood, makes in it a split, in which he inserts a peg to keep it agape; into this split he places loosely a morsel of tinder plucked out of his girdle or skirt. He next cuts from his dry coil of rattan a short length, lays it on a dry leaf on the ground and places over it the tinder plug in the cleft stick; then placing his knee or foot on the end of the stick, he pulls the rattan cord rapidly to and fro under it till the tinder ignites, when, by blowing gently through the cleft, he fans the spark into a flame. The whole operation is the most effective and rapid of any native fire-producing contrivances that I know."

On the lower slopes of the main Owen Stanley Range, in the hinterland of Port Moresby and the Motu area, the KOIARI employ the same device, as observed

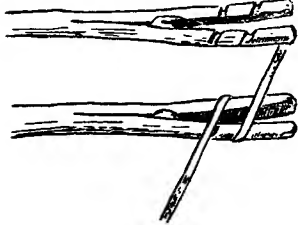
¹ *Across Papua*, 1909, p. 149.

² *Proc. Geogr. Soc.*, xii, 1890, p. 562.

by the Rev. W. G. Lawes in the Tabure and Sogere villages on the slopes of Mount Warirata (Astrolabe Range), c. $9^{\circ} 25' S.$, $147^{\circ} 20'$ to $147^{\circ} 33' E.$, the natives of which are typical Koiarians.¹

"They get a dry stick of pithy wood and split it a little way. In the cleft they put a piece of wood or a stone to keep it open, then putting a little rubbish as tinder under the split part of the stick, they stand on the other end and pass a strip of rattan cane or bamboo under the cleft, drawing it rapidly up and down, when it soon begins to smoke, and a spark appears between the fork of the stick, which with a little manipulation sets fire to the tinder and a flame is soon obtained. It seems to me easier and quicker than the common way of getting fire with two sticks."

Dr. O. Finsch also saw fire made in the same manner amongst the Koiari. He tells us² that the stick, called *newäta*, is short, peeled and longitudinally split at one end, the cleft being wedged open with a stone. The native takes a handful of dry grass, rubs it up into a pellet and lays it under the cleft stick, on which he places his foot to hold it firmly.



KOIARI, N. GUINEA.

FIG. 23.

A long strip of split bamboo, called *ana*, is drawn to and fro through the cleft, fire often being obtained in 30 seconds. The *ana* is carried by every native; any dry stick will serve for the "hearth." It will be noted that the thong is described as passing *through* the cleft, but the figure (Fig. 23) given by L. Frobenius³ of the apparatus which Finsch gave to the Berlin Museum shows the thong passing round *both* limbs of the cleft stick, in the more usual manner, and, moreover, the friction-grooves appear to indicate that this was actually

the case. It seems likely that Finsch's description was slightly at fault, in spite of there being precedent in Borneo for the procedure as described by him, and in German New Guinea also, if Miklucho-Maclay's description, quoted below, is correct upon this point.

In German New Guinea the occurrence of the flexible fire-saw has been noted by several observers, though the recorded localities are all confined to the eastern district lying between Astrolabe Bay and Huon Gulf, and are situated either on the coast or at no great distance inland. The first person to refer to this process in German New Guinea was the Russian, N. v. Miklucho-Maclay,⁴ who observed it in 1872 in some of the hill-villages of Englam-mana and Tiengum-mana near the Malay Coast (Rhaj Coast), to the south of Astrolabe Bay. A piece of very dry wood, called *ilol*, was split at one end with a stone axe, and a strip of split cane or liana was passed through the cleft and sawn backwards and forwards with increasing rapidity in the usual manner. The wooden billet was held down on the

¹ Letter from Mr. Lawes to the Roy. Geograph. Soc., *Proc. R.G.S.*, v, 1883, p. 357.

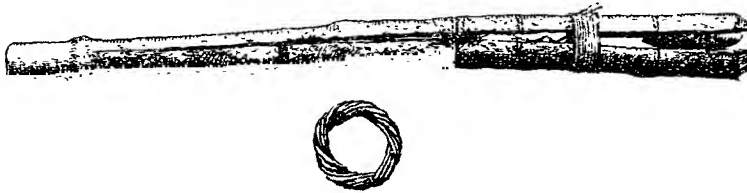
² *Ann. d. K.K. Naturhist. Hof-museums in Wien*, iii, 1888, p. 323.

³ *Völkerkunde in Charakterbildern*, 1902, i, p. 342.

⁴ "Ethn. Bem. über die Papuas," *Natuurkundige tijdschrift voor Nederlandsch-Indie*, xxxv, 1875, p. 83. Quoted in B. Hagen, "Unter den Papuas," 1899, p. 204.

ground with the knee or the foot. Tinder of coconut-fibre was placed under the friction point. The operation lasted half an hour. Here, again, the thong is described as passing *through* the cleft, and one would have liked confirmation of this. The time stated to be required to obtain the spark is remarkable in view of the statements by other observers as to the ease and rapidity with which fire can be procured by this method. One wonders how a thin strip of cane could withstand the friction so long without breaking, and also how the operator could continue the motion for half an hour without becoming exhausted. Half a minute is nearer the time usually required to produce the desired effect.

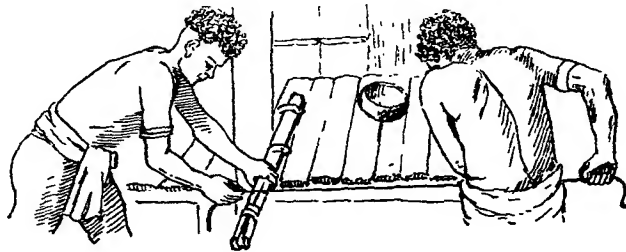
Further south, the method is employed by the POUM, who dwell in the mountains inland from the coast, to the north-west of Finsch-Hafen. The process has been described by Dr. Rudolf Pöch,¹ to whom it was shown by Mazeng, one of the chiefs of the tribe, who selected a dry stick with the bark attached, about a metre long and about 5 cm. in diameter. This was split longitudinally at one end,



POUM, GERMAN N GUINEA

FIG. 24.

the cleft being wedged open with a small piece of wood (Fig. 24). This stick was bound round to prevent the cleft extending too far. It was then firmly bound to the house-post in a horizontal position. Next, Mazeng tore a fragment from his bark coat and forced it into the cleft. Then he untwisted one of the many armlets of coiled rattan strip which he was wearing, so as to have a thong about a metre in length. He and another man, standing on opposite sides of the fixed cleft stick, laid the cane thong over the wood where the tinder was placed, and pulled the ends alternately



POUM

FIG. 25.

until, at the end of not more than a minute, the cane snapped, by which time the tinder had become ignited (Fig. 25).² Pöch is no doubt right in

¹ *Mit. d. Anthrop. Ges. in Wien*, xxxvii, 1907, p. 59; *Globus*, xcii, 1907, p. 196; *Geographical Journal*, xxx, 1907, p. 612.

² This figure, copied from *Leitfaden der Völkerkunde*, by Dr. K. Weule, is apparently based upon Pöch's description.

suggesting that the wearing of this particular kind of cane armlet is connected with this method of making fire. It is very commonly worn amongst the Poup, but is rare among the neighbouring Kai tribe of the Sattelberg district, who do not appear to make fire in this manner. The cane thong is always ready to hand, as it is only necessary to untwist a convenient length from the armlet, and, as has been pointed out, the Tapiro pygmies of Dutch New Guinea wear identical armlets and employ them in an identical manner for fire-making. The Poup do not exhibit any marked Negritic affinity, but it is noteworthy that the Kai, though speaking a pure Papuan language, are a meso- to brachycephalic people of low stature, the men averaging 5 feet, while a considerable percentage measure only 4 feet 4 inches.¹ So that it appears that a pygmy element remains in this region.

The HUPE, who are near neighbours of the Poup, living to the south-east of the latter, in a district to the west of the Sattelberg, inland from Finsch-Hafen (c. 147° 30' E., 6° 20' S.), produce their fire in a manner nearly identical with that practised by the Poup. The following description is derived from Dr. R. Neuhauss.² Among the Hupe, as among the Poup, two men perform the operation. The cleft stick is lashed to two other long sticks so as to form a tripod. Dry grass or bast is lodged in the cleft and two men saw a rattan thong across the cleft over the tinder, pulling the ends alternately (Fig. 26). Fire is quickly and easily obtained by them. Neuhauss cinematographed the process. In order to have a ready supply of cane strip for fire-making, the Hupe wear armlets of coiled cane like those of the Poup and Tapiro.



HUPE, GERMAN N GUINEA

FIG. 26.



INLAND FROM SAMOA HAFEN, G. N. G.

FIG. 27.

Lastly, the natives of the district inland from Samoa Hafen, in Huon Gulf (c. 7° S.), as observed also by Neuhauss (*op. cit.*), employ the cane fire-saw after the less elaborate fashion prevalent in British and Dutch New Guinea. They do not

¹ *Geographical Journal*, xxx, p. 610.

² *Deutsch Neu Guinea*, 1911, i, p. 252, and iii, p. 24.

fix the stick upon a framework, but the operator (one only) stands upon a stick which is cleft and holds some dry grass as tinder, and saws with the cane thong passed under it (Fig. 27). The neighbouring Lae-Womba on the lower Markham River employ the "fire-plough."

The references which I have so far given show a very wide, though undoubtedly *connected*, geographical range for this specialized system of fire production, extending, as it does, from Assam to Eastern New Guinea, the two extremes of dispersal being linked by sporadic occurrences of this method throughout the intervening area. There can be little doubt that the flexible thong-saw is closely related to the better known sawing method, *i.e.*, with a rigid, blade-like "saw" of bamboo or wood, which prevails in the Asiatic Islands as far east as the Philippines and the Kei Islands, and to the westward extends to the Malay Peninsula, Burma, Siam, the Nicobars and India (Madras Presidency). In Australia, too, this method of "sawing" fire is fairly common. In some instances, where wood is used instead of bamboo, the lower stick is split and the cleft is wedged open, just as is so very frequently done where the cane thong-saw is employed. Or, instead of splitting the wood, a piece may be chosen which has a natural crack in it, answering the purpose of a cleft, or again a groove or pit is cut in the wood and the "saw" is worked across this. This use of a cleft or longitudinal groove across which the sawing is performed, affords an additional link between the two methods of fire-sawing. It is difficult to determine which of the two methods is the more primitive, but perhaps the rigid saw may claim to be regarded as the earlier. It is rather more simple, and its prevalence in Australia, where the flexible saw does not exist, may emphasize that claim to priority of invention. On the other hand, the flexible saw is a marked feature in the culture of those tribes in New Guinea which show Negritic affinities, or which are adjacent to Negritic tribes, amongst whom the rigid fire-saw is not known. The one method has not been, strictly speaking, evolved from the other, since intermediate stages do not occur, and cannot very well do so; but it seems likely that both are variants of the same procedure, arrived at in slightly different ways and converging. A previous knowledge of the rigid fire-saw would readily have suggested the adoption of the flexible saw as a variant or alternative in districts where cane is common and is used for other purposes in the form of narrow strips.

AFRICA.—Leaving now this important and extensive eastern area of dispersal of the flexible fire-saw, let me turn to other regions in which this particular manner of producing fire has been observed. As far as I am aware, there is only one other part of the world where this process has been noted amongst a people living under conditions of strictly *primitive* culture and this, curiously enough, is completely isolated from the rest of the geographical distribution. This is in West Africa, among the Ba-Kele (Ba-Kalai or A-Kele) of the Ogowé River district. The late Miss Mary Kingsley wrote,¹ "On one occasion I saw a Ba-Kele

¹ *Travels in West Africa*, 1897, p. 600.

woman make fire by means of a slip of raphia palm drawn very rapidly, to and fro across a notch in another piece of raphia wood." As far as I am aware, there is no other similar reference to this method in any part of Africa, and one must regret that Miss Kingsley's description of the process is so meagre, as it barely suffices to convince one that this is an undoubted instance of the employment of a flexible saw in fire-making. An illustration would have made it clear, but this, unfortunately, is lacking. The expression "a *slip* of raphia palm *drawn* . . . to and fro *across* . . .," seems definitely to suggest a narrow and therefore pliant band of the material, the ends of which were alternately pulled, to cause the friction by sawing transversely across the stick, and if this is the correct diagnosis, then the apparatus is strictly analogous to the flexible fire-saw of the Indonesian area and of New Guinea. Moreover, the description cannot apply either to the "hand-drilling" method or to the "ploughing" ("stick and groove") method of fire-making, which are the only other frictional methods described from "Savage" Africa, unless a statement, which has, I believe, been made, that a form of fire-saw is used in Katanga, is substantiated. Perhaps some light may be thrown upon the Ba-Kalai fire-saw by other witnesses. In the meantime I merely refer with a certain amount of reserve, due to lack of detail and corroboration, to the only record I have found of this characteristically eastern method being practised in Africa.

EUROPE.—It is interesting to note that among several other methods whereby "New-fire" or "Need-fire" is, or has been, produced for ceremonial purposes, the flexible fire-saw finds a place. I need not here enter into the general consideration of the survival in Europe of primitive frictional fire-making appliances, as a feature in certain religious or superstitious observances. The belief that fire after prolonged use becomes stale, as it were, and loses its mystic power and virtues, is, or at any rate has been, very widely spread in Europe, even amid environments of highly developed culture. The persistence of this belief into quite recent times is very remarkable.¹ The actual procedure varies in the different localities, and the apparatus employed to elicit the new-fire occurs in several different forms, but I will confine myself now to the instances of the employment in Europe of the flexible fire-saw for this purpose.

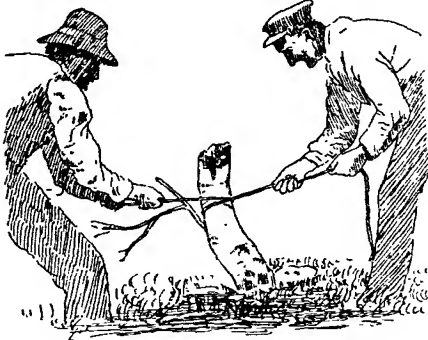
SWEDEN.—The following descriptions and figures of the various procedures as practised in Sweden, when need-fire (*nödeld* or *ynideld*) was required, are culled from a very interesting paper by Nils Keyland.²

First method.—A length of rope, willow-strip or strap is passed *completely round* a log of wood, and the ends are pulled alternately by two men until a spark is generated and can be caught upon a piece of tinder (Fig. 28). This manner of making fire is employed in Ekshäräd, Vermland, both for amusement and

¹ *Vide* Grimm, *Teutonic Mythology*; Tylor, *Early Hist. of Mankind*; Kuhn, *Die Herabkunft des Feuers*, etc.

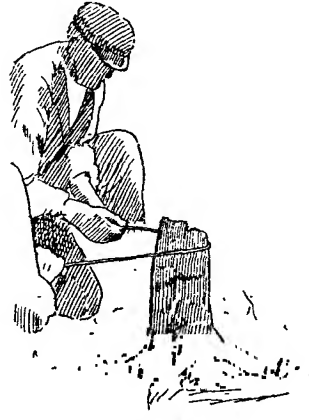
² "Primitiva eldgörningsmetoder i Sverige," *Fataburen*, 1912, pp. 15-17, and 1913, pp. 92-94.

ceremonially, in cases of special need. August Björnander, of Månstads socken, Kindshärad, Västergötland, who was born in 1839, describes a similar process, in which a bast rope is wound *twice* round a dry branch of birch or aspen, on which the bark remains, or else round a dry tree-stump. The cord was pulled by two men.



VERMLAND, SWEDEN

FIG. 28.



VERMLAND, SWEDEN.

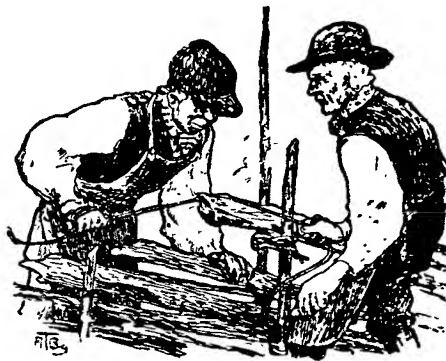
FIG. 29.

Second method.—This varies from the first only in the thong being passed *half round* the log or stump. One man can thus perform the operation, pulling both ends of the thong himself, though in the illustration (Fig. 29), two are shown, each of whom pulls one end; Ekshärad, Vermland. According to information supplied by Nils Olsson Lack of Lindhöjden, Elgå socken, Vermland, need-fire was produced by pulling a cord passed half-round a dry pine, or fir-stick, which was held firmly between the knees (Fig. 30). This method was practised by the forest peasants when necessity drove them to it.



VERMLAND, SWEDEN.

FIG. 30.



VERMLAND SWEDEN

FIG. 31.

Third method.—Jan Olsson of Våxvik, Köla socken, Vermland, described a manner of producing need-fire by sawing a rope backwards and forwards over the

top rail of a wooden fence (Fig. 31). The information was based upon hearsay, and it was not stated whether the process was conducted for any special purpose.

Fourth method.—This is a peculiar variant, as the thong is fixed and the billet of wood is moved along it. One end of the thong, which is passed round a small stick, is attached to a stump, or other fixed object, and the other end is held by a man who strains it tightly, so that it grips the centre of the stick, which is thus held transversely. A second person, holding the ends of the stick in his hands, forces it backwards and forwards (spokeshave fashion) along the thong, the encircling portion of which causes enough friction to generate the desired spark (Fig. 32), Ekshäräd, Vermland. This inversion of the more usual practice is comparable with the *inverted* sawing process in Burma, Borneo and elsewhere in the East, in which the bamboo blade (or saw) is fixed, and the “hearth” is worked



FIG. 32.



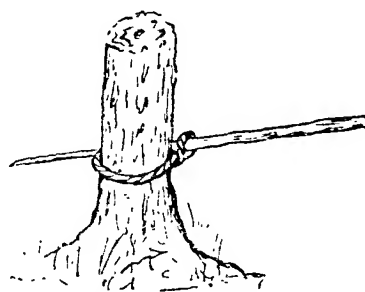
FIG. 33.

like a spokeshave along its upturned edge, a method sometimes practised as an alternative to the more usual one of sawing the blade across the fixed “hearth.” Both ways are equally easy when bamboo is employed, and I have very frequently performed the operation successfully.

Fifth method.—Another variant of the flexible-saw mechanism was used in Småland, South Sweden, in the eighteenth century (1763) for averting the evil glance (*fascinationem*) when fishing-gear was thought to have been bewitched. A hole was bored in an oaken door-post, and through it a strap or cord was drawn backwards and forwards till fire was obtained and could be caught in brimstone. The fishing-gear was then smoked over the fire so created.

According to Smiback-Johannes of Växvik, Vermland, a man of about 80 years of age, need-fire was made by a similar procedure in order to cure pigs when smitten by disease. A leathern thong was passed through a hole in a door, and a couple of men, standing on either side of the door, pulled the ends alternately until a spark was generated by the friction (Fig. 33). From this a fire of shavings, etc., was kindled at the door of the pig-stye, and the pigs were driven through it.

Sixth method.—The description of a very curious and seemingly unique thong-sawing method of fire-production is contributed by J. P. Hedberg, who says that his father, who was born in 1828, served in his youth as farm labourer with a peasant in Åbyn, Sävar socken, Vesterbotten, North Sweden. One day he and his employer were in the forest and wanted a fire, but had no means of making it. So they took a fairly long strip of withy or birch which they twisted up into the form of a closed ring. This ring or loop they fitted round a dry old fir-stump, and they then pushed the end of a stick between the stump and the ring, twisting the loop once round the stick to make it grip the stump firmly, whereupon, using the stick as a lever, they walked round the tree-trunk (Fig. 34). The friction of the cord, thus sawn against the stump generated smoke, and later a spark, from which fire was obtained. J. P. Hedberg, although he was not present on the above occasion, at a later date saw fire produced for fun by the process which he describes. This was apparently in Ångermanland, North Sweden.



ÅNGERMANLAND, SWEDEN

FIG. 34.

GERMANY.—Grimm¹ quotes the following passage from Lindenbrog's *Glossary of the Capitularies*:—" *Rusticani homines in multis Germaniae locis, et festo quidem S. Johannis Baptistae die, palum sepi extrahunt, extracto funem circumligant, illumque huc illuc ducunt, donec ignem concipiat, quem stipula lignisque aridioribus aggestis curate foveant, ac cineres collectos supra olera spargunt, hoc medio erucas abigi posse inane superstitione credentes. Eum ergo ignem "nodfeuer" et "nodfyr," quasi necessarium ignem, vocant.*" The description given in this account appears clearly to indicate a process of obtaining new-fire (*nothfeuer* of the Germans) by pulling a cord to and fro round a stake and causing a spark by sawing-friction. The expression "*illumque huc illuc ducunt*" seems more applicable to drawing the cord (*funis*) than to turning the stake (*palus*), though the possibility occurs to one that this record is merely a careless description of the far commoner method of turning a spindle, jammed between two uprights, with the help of an encircling cord, after the fashion of a "thong-drill." The latter process was widely practised in Europe, from Scotland and Scandinavia to the Balkan States. We may, however, be content to take the passage literally and accept it as affording an instance of the use of the flexible-sawing method in Germany; the more so, since there is precedent for its occurrence in various parts of Northern Europe. The particular use of the ashes of the fire kindled in this manner—that is, for driving away caterpillars from the kitchen garden—is interesting.

In the Mark, Germany, the custom prevailed of making a *nothfeuer* on certain occasions, especially when there was disease among the swine. "Before sunrise two stakes of dry wood are dug into the ground amid solemn silence, and hempen

¹ *Teutonic Mythology*, 1883, ii, p. 604.

ropes that go round them are pulled back and forwards till the wood catches fire; the fire is fed with leaves and twigs, and the sick animals are driven through."¹ Here, again, a suspicion may arise that the apparatus may have really been of the nature of a "thong-drill" rather than a "cord-saw." At least, the reference to *two* stakes fixed in the ground is suggestive of the two uprights between which a spindle would be jammed, so that it could be rotated with a cord and create friction against the uprights. It is regrettable that the descriptions have not furnished more detail, making the precise method perfectly clear. The practice of kindling *nothfeuer* by friction continued in the Mark as late as the middle of the nineteenth century.

RUSSIA.—An interesting account of procuring need-fire for prophylactic purposes, is given in a chapter on "Religio Russorum Aliae superstitiones," written in 1581.² I am indebted to Sir A. Evans for the loan of this book. The passage runs as follows:—*Luem castrensem, quam nostri milites huc advexerant, tali modo eos propulsare vidi. Funem accipiunt, eumque per foramen scamni in domo vetustioris tantisper trahunt et retrahunt, donec ignis scintillam ex arido assere eliceant: flamma conspecta, cereum in delubro undis lustralibus perfusum accendunt. Omnes deinde qui ex hac favilla prunas vel torrem domi conservant, tutos fore credunt a pestifera contagione, et fit nonnunquam, ut eventus fidei respondeat.* The process here described is identical with that already referred to, as occurring in Småland, in Southern Sweden. A cord was drawn to and fro through a hole in a dry old bench, and from the fire obtained by the friction a wax taper, which had been sprinkled with holy water, was lighted. Embers kindled from this and preserved in the houses, were believed to protect the people from the contagion of camp-fever; and, as the author dryly remarks, "It sometimes does happen that the result is in keeping with their belief." From the context it may be inferred that the above description applied to Ruthenia (Little Russia).

I have now quoted the various references to which I have had access, dealing with the process of fire-making with a flexible sawing-thong, and it will be seen that there are three distinct areas of geographical distribution. (1) An Eastern area extending from Assam to New Guinea; (2) West Africa; (3) Europe. These three areas must be considered separately, as, in the absence of evidence which might indicate a culture-connection linking them together, we must, provisionally at any rate, regard the use of the sawing-thong in fire-making as having very possibly arisen independently in the three regions.

The first of these, the EASTERN AREA, in spite of the many gaps which break the continuity in distribution of this appliance at the present day, none the less appears very definitely to represent a connected culture-area. Within the limits of

¹ Adalbert Kuhn, *Märkische Sagen und Mörchen*, 1843, p. 369, quoted in Grimm's *Teutonic Mythology*, II, p. 605.

² Johannes Lasitzki (Lacicius Polonus), "De Russorum, Moscovitarum et Tartarorum religione, sacrificiis, nuptiarum, funerum, ritu. E diversis scriptoribus." *Spirae Civitate Veterum Nemetum*, excudebat Barnardus D'albinus, anno 1582. Page 246.

the eastern range of the thong-saw, there are traceable several widely differentiated racial elements, though the purity of type is usually greatly obscured by miscegenation, a fact which renders very complicated the ethnological problem in this region. An ethnological study of the flexible fire-saw seems to bring into prominence two of these racial elements more especially,—the Indonesian (pre-Malayan) and the Negritic stocks—and it appears probable that to one of these the origin and invention of this variety of the fire-saw is due. Although there are a few variations in matters of detail in the mode of employment of the apparatus, these are not sufficiently distinct or localized to warrant a theory of independent invention in two or more centres within the Eastern area. As has been seen from the descriptions given above, these variations are not as a rule restricted to any special districts, but are liable to recur even in widely separated regions; while such instances as occur of local specialized types—such as the anthropomorphic design of the Kayan fire-stick—are clearly due to an elaboration of the normal and widely-spread form of the apparatus.

At one extremity of the range of dispersal in the East are the Tibeto-Burman Nagas and the nearly-related Tipperahs, and they, as well as the Mois of the Annam frontier, must be linked culturally with the Indonesian peoples. There are very strong affinities between the culture of the Nagas and that of some of the natives of the Asiatic Islands, notably the natives of Borneo; while striking similarities may be traced from Assam as far east as the Philippines and Melanesia, and even further. The coincidences are too numerous to be fortuitous.

In the Malay Peninsula, which, presumably, was on the line of route of the early migration from the Asiatic mainland into the Archipelago, we find the Sakai, Semang and Malays all employing the thong-saw. The short-statured, curly-haired Sakai (pre-Dravidian or Dravido-Australoid) appear to have racial affinities with some primitive peoples in the Asiatic Islands (*e.g.*, Sumatra and Celebes), and even, according to Moszkowski, in New Guinea (Geelvink Bay). The Negritic Semang are akin to the Negritic pygmies, of whom traces may still be found in several of the islands of the Archipelago, and who persist, as a remnant of an early immigration, in New Guinea, and still form an important element in the local population. It appears likely that the Malays of the Peninsula derived the thong-sawing process either from the Sakai or the Semang, since, as far as I am aware, there is no record of this method of fire-production in Sumatra, the original home of the Malays, nor among true Malays elsewhere.

In Borneo, the Kayans, according to Hose, probably represent an offshoot from the Indonesian migration from the mainland, which spread from the basin of the Irrawadi, and they have physical as well as cultural affinities with the Nagas. The Kenyahs are believed to have been a still earlier immigrant people exhibiting a blending of Caucasian and Mongoloid elements, who entered Borneo while it was still connected with the mainland. Hose is also of opinion that the Kenyahs have derived the principal elements in their culture from the Kayans, whose characteristics they have assimilated very completely. Probably the use of the

thong-saw by these two tribes almost exclusively among the inhabitants of the island is referable to this transmission of cultural elements from the one tribe to the other, and in this case it is likely that this apparatus reached Central Borneo and Sarawak from the S. or S.E. parts of the island, and accompanied the migration of the Kayans along the larger rivers into the uplands of the central region.¹ The former existence of a Negritic people in Borneo, which although not conclusively proved, is regarded as highly probable, gives rise to the alternative possibility of the Kayans and Kenyahs having derived the process from an earlier pygmy population, akin to the Semang, and of whom very few traces remain to-day.

In the Philippines, the flexible fire-saw appears to be associated, mainly at any rate, with tribes of Negritic or partially Negritic stock, though the pre-Malayan, Indonesian element is widely represented in the group, strongly tinged with Mongoloid characteristics; and it may be regarded as an open question, whether the thong-saw was introduced into the Philippines by Indonesians or by Negritos. The passage from Borneo to the main Philippine group *via* Palawan and Mindoro would have been an easy one, the distances by sea being short.

When we come to New Guinea, the association of this apparatus with the pygmy Negritic race becomes more marked. Although from the descriptions given in this paper it is clear that in certain districts tribes of pure Papuans, or, in some cases, of Papuo-Melanesian stock, practise fire-making by this process, it must be admitted that the thong-saw is more particularly characteristic of the upland pygmy peoples, and of those tribes in whose physique some Negritic features are traceable. It is noteworthy that, with comparatively few exceptions, the Papuan and Papuo-Melanesian employers of this system of fire-making, inhabit districts where they have been liable to come into contact with peoples whose Negritic affinities are more or less well defined; and in view of the frequent occurrence of the thong-saw among the upland peoples, usually of low stature and presenting other Negritic tendencies, and also of the fact that the neighbouring taller Papuans and Papuo-Melanesians more usually adopt some other method (*e.g.*, the "fire-plough")—it appears probable that the flexible fire-saw was introduced into New Guinea by the early immigrant Negritos, and was transmitted by them to some of the later dominant peoples, as a result of culture-contact. Apart from the general close resemblance observable in the apparatus and in its mode of employment in the two regions, the use of a cane strip in very long lengths, ordinarily kept coiled up for wearing as armlets, affords a striking link between the thong-sawing process in the Philippines and its counterpart in New Guinea, in both of which regions this method of fire-making is closely identified with Negrito culture.

The final solution of this problem must await further investigation. At one (the north-west) end of the range of its dispersal in the east, the probability of an Indonesian origin of this contrivance is distinctly suggested; while, on the other

¹ Hose and McDougall, *The Pagan Tribes of Borneo*, chapter on the ethnology of Borneo.

hand, at the other (the east and north-east) end, the Negrito origin is equally definitely indicated. A wider knowledge of Negrito culture and distribution may enlighten us. Both the split and the unsplit forms of the fire-stick or "hearth" occur at the extreme ends of the distribution, and the details of method in the employment of the apparatus, while varying locally to some extent, do not present such well-defined variations in the several districts, as to offer any definite clue as to the original home of the system.

It seems probable that the flexible fire-saw of the East was invented as a variant from the better-known rigid, blade-like fire-saw. It occurs to a great extent over the same area as is occupied by the latter, the two processes being sometimes employed alternatively by the same people. Bamboo, which is the prevailing material employed for both parts of the rigid fire-saw, is used, instead of wood, for the "hearth" of the thong-saw by certain tribes (*e.g.*, the Mois and Tipperahs) and occasionally by the Sakai, and this affords a link between the two methods. A further link between the sawing-blade and the sawing-thong methods is suggested by the occasional splitting of the *wooden* "hearth" sometimes employed with the former, as, for instance, in Australia.

The second distinct area of distribution of the thong-saw—*i.e.*, WEST AFRICA—is a peculiarly isolated one, since, as already stated, the only people in Africa who have been credited with the use of this method of fire-making are the Ba-Kalai of the Ogowè River district. The possibility of an *independent* origin of the system in this region is forcibly suggested. At the same time, when we recall the numerous striking resemblances observable in the arts and appliances of native tribes in Africa on the one hand, and those of the Southern Asiatic area and the Malayan Archipelago on the other, it must be admitted that it is not quite impossible that the Ba-Kalai may owe their acquaintanceship with the thong-saw to some remote contact with the sources of Asiatic culture, and that there may perhaps, be a true phylogenetic relationship between these now widely separated forms of the apparatus. In connection with the Asiatic and Indonesian elements traceable in African culture, I can only here refer to Dr. L. Frobenius' book¹ and to a paper by Dr. B. Ankermann.² The general subject is too wide for me to enter into it here.

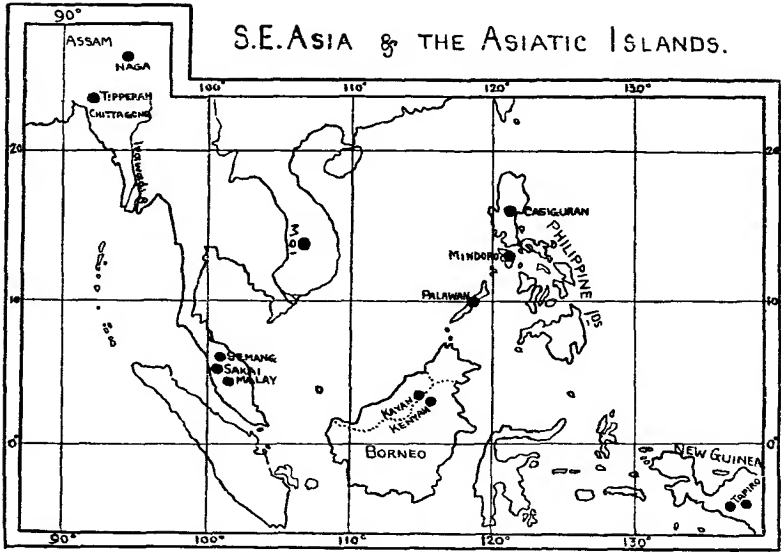
The third area to be briefly considered—the EUROPEAN area—is again apparently very distinct from and quite unconnected with the other two, as far as the appliance under discussion is concerned. There seems little likelihood of tracing in Europe such affinities with Negritic, Indonesian, pre-Malayan or Bantu culture, as would warrant the suggestion of a probable common origin for the thong-saw of Europe and that of other parts. As far as the records show, the variety of frictional fire-production in Europe is and has been associated almost, if not quite exclusively, with the practice of procuring ceremonial—or *need*-fire, but for this

¹ *Ursprung der Kultur*, 1898, vol. i.

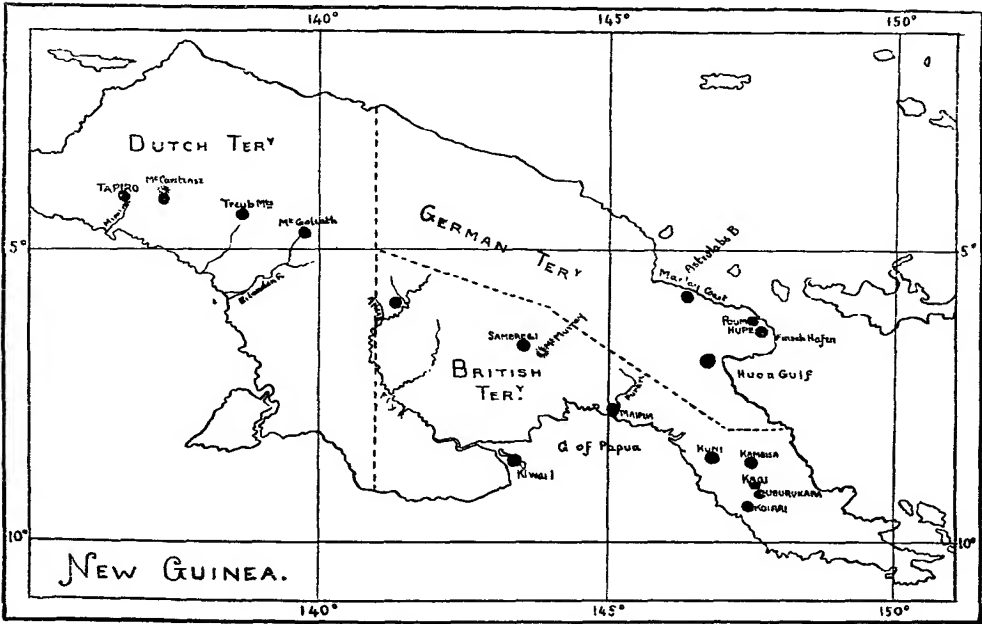
² "Kulturkreise und Kulturschichten in Africa," in *Zeit. f. Ethnologie*, 1905, p. 54.

purpose European peoples have far more frequently resorted to the *thong-drilling* method, whereby a spindle is caused to rotate in a socket cut in a vertical stake, by means of a cord or thong passed once or twice round it, the ends of the thong being alternately pulled so as to cause a reciprocal rotation of the spindle, the friction of which against the stake generates the heat required to create a spark. This thong-drilling process is widely dispersed in Europe (British Islands, Scandinavia, Switzerland, Germany, the Balkans, etc.), and it has occurred to me as very possible, that it must frequently have happened that, owing to the spindle becoming jammed, it may have refused to rotate when the thong was pulled. In such an event, the thong would have slipped on the fixed spindle as its ends were violently tugged alternately, and the friction created by this involuntary sawing of the cord upon the wood, would have caused smoke to arise in a very few seconds, thereby indicating that fire could easily be obtained by this method, as an alternative to employing the rotating spindle. The misuse of the one method may so readily have suggested the other, that a theory of the likelihood of the thong-saw having arisen independently in Europe may be regarded as a perfectly plausible one.

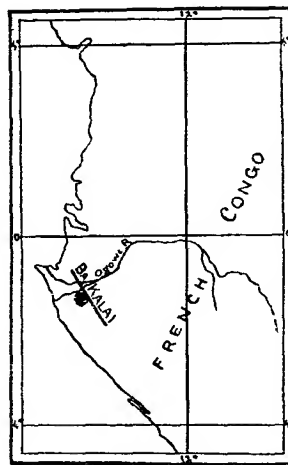
In conclusion, let me say that whereas I have endeavoured to bring together as many references to the use of the thong-sawing method as possible, I am nevertheless conscious of the fact that my list is probably far from complete, and that much more information and material is probably available. Many unrecorded examples of the apparatus must exist in museums, and there are, no doubt, many references in literature which I have not yet seen. I shall feel very grateful for any information which will help in tracing still further the geographical distribution and varieties of this interesting frictional fire-making process, and I trust that at a later stage many of the gaps in the continuity of dispersal may be filled up, and sufficient links in the series be forthcoming to admit of a more complete and detailed treatment of the subject.



MAP I.

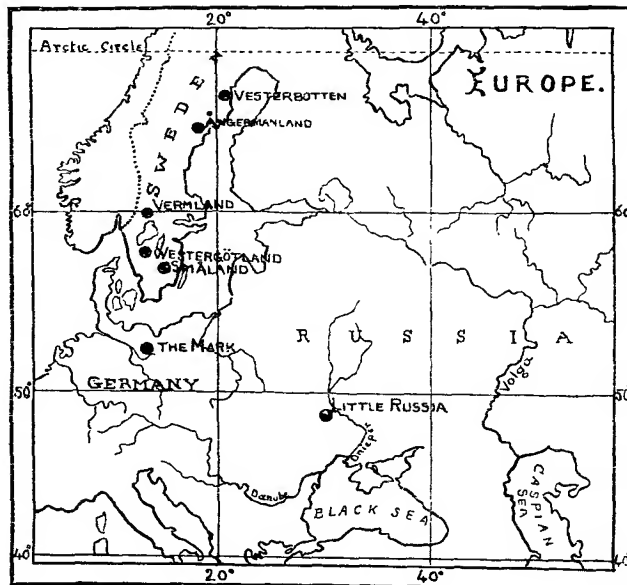


MAP II.



WEST AFRICA.

MAP III.



MAP IV.

LIST OF THE FIGURES ILLUSTRATING THIS PAPER.

1. Naga of the Naga Hills, Assam, making fire with the thong-saw of cane and a dry log. After S. E. Peal, *Journ. Anthropol. Inst.*, xxii, 1893, Plate XVIII.
2. Naga thong-sawing apparatus of wood and cane. From a rough sketch of a specimen in the Berlin Museum.
- 2A. Naga thong-sawing apparatus from Naga Hills near Mokokchung, given to the Pitt Rivers Museum, Oxford, by Mr. J. H. Hutton. *a* = the fire-stick of lime-wood showing one used fire-groove and notches cut as a start for the next; *b* = a bamboo strip from which the narrow sawing-thongs are split, about 54 cm. long; *c* = one of the unused sawing-thongs trimmed up for use; *d* = one of the thongs which has been snapped in the middle by use; *e* = the tinder made from the shavings produced in trimming and smoothing the thongs.
3. Semang thong-sawing apparatus from Grit, Upper Perak. The stick of soft wood is 59.6 cm. long. Collected by Messrs. Annandale and Robinson. Now in the Pitt Rivers Museum.
- 3A. Thong fire-saw of the Semang of Grit, Upper Perak. British Museum. Copied from the "Handbook to the Ethnographical Collections," 1910, Fig. 7c.
4. Sakai of Perak making fire with the thong-saw. From Captain G. B. Cerruti, "Nel Paese dei Veleni," 1906, p. 161.
5. Thong-sawing apparatus of the Malays of Perak, collected by Mr. Leonard Wray. The stick is of very soft wood and is 76 cm. long. Pitt Rivers Museum.
6. Malay of Perak sawing fire with cane thong. From a photograph sent to me by Mr. Leonard Wray.
7. Kenyah fire-sawing apparatus, Pata River, a tributary of the Baram River, Sarawak. With bundle of bamboo strips for sawing. Used at the ceremony of naming a child. From Dr. W. H. Furness, "Home-life of the Borneo Head-hunters," 1902, p. 38.
8. Kayan of Sarawak making fire with the thong-saw. From a photograph given me by the late Mr. Robert Shelford.
9. Kayan ceremonial fire-making outfit, Baram district, Sarawak. The "hearth" is 27 cm. long and is carved to represent *Laki Pesong*. Used at the child-naming ceremony. Cane thongs and the small mat upon which the fire was made are tied up with the "hearth." Specimen given by Mr. C. Hose to the Pitt Rivers Museum.
10. "Hearth" of ceremonial fire-making apparatus, Baram district, Sarawak, of soft, white wood, 58.2 cm. long, carved at both ends; with cane sawing-thong. Specimen sent to me by Mr. C. Hose.
11. Kayan ceremonial fire-sawing outfit, Baram, Sarawak. The "hearth" is split but is not carved; 29.8 cm. long. Cane strips and tinder of palm-scurf. Specimen given by Mr. C. Hose to the Pitt Rivers Museum.
12. Kayan ceremonial fire-sawing apparatus with carved "hearth," cane strips and small mat, Baram, Sarawak. From C. Hose and W. McDougall, "Pagan Tribes of Borneo," 1912, II, Plate 168, Fig. 2.
13. Fire-saw of the Kayans of Central (Dutch) Borneo. From a photograph by Dr. A. W. Nieuwenhuis, "In Central Borneo," 1900, I, Plate 19.
14. Fire-sawing outfit of the Negritos of Casiguran, North-East Luzon, Philippine Islands. *a* = the split "hearth"; *b* = the long, coiled cane thong; *c* = bark-cloth used as tinder. Copied from Dr. A. B. Meyer, "Die Philippinen," Dresden, 1893, Plate II, Fig. 7.
15. Pygmy of Palawan, Philippine Islands, making fire with rattan sawing-thong, bark cloth being placed under the fire-stick to serve as tinder. After a photograph by F. Cooper Cole, "Customs of the World," 1913, p. 657.
16. Fire-saw of the Tapiro pygmies of the Mimika River, Dutch New Guinea. *a* = the split fire-stick, 25.3 cm. long, scored with many grooves from use; *b* = coiled up rattan-strip used as a sawing-thong. Specimen given to me by Mr. A. F. R. Wollaston.

17. Another example of the same, but the stick is split right through, the two parts being secured together with a cane strip. Given me by Mr. A. F. R. Wollaston.
18. Tapiro pygmy using the thong fire-saw. From a photograph in "Pygmies and Papuans," by A. F. R. Wollaston, 1912, p. 200.
19. Fire-stick probably from the head-waters of the Fly River, New Guinea, grooved by the friction of a rattan strip. Copied from L. M. D'Albertis, "New Guinea," 1880, II, p. 378, Fig. 2.
20. Fire-making outfit of the Maipua tribe, Purari Delta, British New Guinea; tied up in a bundle as carried about. Length of fire-stick, 85 cm. The cane thong is in long strips. Specimen in the Pitt Rivers Museum.
21. Man of the Kuni tribe, Dilava, Mekeo district, British New Guinea, making fire with cane sawing-thong. From a photograph by P. Fillodeau, *Anthropos*, II, p. 108.
22. Fire-making apparatus, Kambisa tribe, Chirima Valley, Mount Albert Edward, British New Guinea. From sketch by C. A. W. Monckton, *Annual Report, Brit. New Guinea*, No. 108, 1907.
- 22A. Fire-stick from the Owen Stanley Range, British New Guinea, grooved by the friction of a cane thong. Specimen in Mr. E. Bidwell's collection. Length about 29 cm. (the length was originally greater, but was reduced for convenience in packing), circumference 7.5 cm. The sketch was not made directly from the specimen and may not be perfectly accurate in detail.
23. Fire-making apparatus of the Koiari, inland from Port Moresby, British Museum, collected by Dr. O. Finsch. Specimen in the Berlin Museum. Copied from Leo Frobenius, "Völkerkunde in Charakterbildern," 1902, I, p. 342.
24. Fire-sawing apparatus with very long rattan thong, coiled up for wearing on the arm. Poum tribe, north-west of Finschhafen, German New Guinea. From a photograph published by Dr. Rudolf Pösch, *Mit. d. Anthropol. Gesellschaft in Wien*, XXXVII, 1907, p. 59, Figs. 2 and 3.
25. Poum tribesmen making fire with the thong-saw. From Dr. K. Weule's "Leitfaden der Völkerkunde," 1912, Plate CVIII, Fig. 9. The illustration is based upon the description given by Pösch.
26. Fire-making with the thong-saw. Hupe tribe, west of the Sattelberg, German New Guinea. From a photograph published by Dr. Neuhauss, "Deutsch Neu-Guinea," 1911, Fig. 170.
27. Native of the district inland from Samoa Hafen, Huon Gulf, German New Guinea, making fire with the thong-saw. From a photograph published by Dr. Neuhauss, *op. cit.*
28. Procuring "need-fire" with a thong-saw, Ekshärad, Vermland, South-West Sweden.
29. Ditto, Ekshärad.
30. Ditto, Vermland.
31. Ditto, Vermland.
32. Ditto, Ekshärad, Vermland.
33. Ditto, Vermland.
34. Ditto, Ångermanland and Vesterbotten, North Sweden.

The last seven illustrations have been copied from Nils Keyland's papers in *Fataburen*, 1912, Figs. 14, 15 and 16; and 1913, Figs. 20, 21, 22 and 23.

Map I.—Distribution of the thong fire-saw in South-East Asia and the Asiatic Islands.

- | | | | | | |
|--------|---|---|---|---|----------------|
| " II. | " | " | " | " | " New Guinea. |
| " III. | " | " | " | " | " West Africa. |
| " IV. | " | " | " | " | " Europe. |

A FEW NOTES ON SOME SOUTH-WESTERN AUSTRALIAN DIALECTS.

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THE dialects from which the following few notes are compiled were spoken by the tribes living along the south-western coast, from (about) Gingin (lat. 31°) to (about) Esperance (lat. 34°). All these tribes were to a certain extent homogeneous. Their marriage laws were the same throughout, the intermarrying phratries being two: Manitchmat and Wördungmat, or "White Cockatoo" stock and "Crow" stock (Manitch, white cockatoo; mat, leg, stock, family, track; Wördung, crow). Crow married cockatoo and cockatoo married crow. The descent, however, differed. From Gingin to (about) the Donnelly River (lat. 35°) descent was maternal, a Manitchmat woman had Manitchmat children, similarly with a Wördungmat woman, whose children were Wördungmat. From Donnelly River to (about) Esperance, descent was agnatic. A Manitchmat woman's children went into the Wördungmat phratry, and *vice versa*. From about Donnelly River northward to Gingin the phratries became subdivided into four matrimonial classes: Ballaruk, Nagarnook (Wördungmat phratry), and Tondarup, Didaruk (Manitchmat phratry). The marriages remained the same as in the phratries.

A slight variation occurred in the many dialects between Gingin and Esperance, but fundamentally they were one. The principal variations were: the dropping of the final syllable in the Albany, Esperance, etc., dialects in words which were otherwise similar to those of Bunbury, Perth, Gingin, etc. Also a change of the initial letters d and t, which became j, in the Gingin dialect, and the change of o to ā in that district. A few examples showing these differences will be given later.

The vowels are pronounced as in Italian and are: a, e, i, o, u.

The short a, as in *mat*, is rendered ä; the long a, as in *rather*, is denoted thus: ā; and the a as in *fall* is shown as â.

The vowels e, i, o are similarly dealt with.

The short sound of u, as in *but*, is represented by ü.

The consonants are: b, d, dh (represented by the symbol d.), g (hard), j, k, m, n, ng (symbolized by ɳ), p, t, th (represented by t.), w, y.

Rolled r, and double or strongly accented consonants, are rendered thus: r, ʀ, k, l, etc.

Diphthongs occur, as : ai (which takes the long sound of y), au (as in *now*), oy (as in *boy*).

The sounds of f, v, s, and z are not met with in the southern dialects, nor does the aspirate h occur.

The dialects of some districts were called by a dialectic variant peculiar to the district, as for example :—

Gingin dialect	...	...	Jābăn wōngi (jābăn, to fetch, or bring, or pick up ; wōngi, speech).
Swan district dialect	...	...	Īla kūri wōngi (kūri, directly).
Avon River, York, Beverley, etc., dialect			Maia wōngi (maia, voice).
Murray River dialect	...	...	Kūri wōngi (kūri, directly).
Capel district	...	...	Dūnan wōngi (dūnan, ?).
Bunbury, Vasse, etc., dialect	...	...	Băřōŋ wōngi (băřōŋ, to fetch, to bring, to pick up).
Palinup and Jerramungup	...	...	Kaiali wōngi (kaiali, north-east).

ARTICLES.

There are no articles. The English sentences : where is the house ? there is the man, would be rendered as, house where (maia winjal) ? man there (yūnar bō'kōja). (Swan dialect.)

NOUNS.

Nouns undergo many inflections and are rich in cases : nominative, genitive, dative, accusative, and ablative.

The genitive is formed by the addition of the terminations āk, āk, in, āŋ, iy, in, oŋ ; e.g. : kāla (fire), kālāk (having fire), mīka (moon), mīkoŋ (belonging to the moon, moonlight), tā (mouth), tā-liŋ (belonging to the mouth, the tongue), dauel (thigh), dauelāŋ (belonging to the thigh), yūp'ār (native), yūpārāŋ kala (native's fire, fire belonging to the natives). (Swan dialect.)

The dative is usually expressed by āl, āg, nā, ō, as : ŋai kū'loŋ-al-yāŋ'aga (I child it gave (to)), (I gave it to the child). (Vasse dialect.)

The accusative has also various terminations in the different districts, ga being the most general : dāja yu-āť'āgā (game (animals) not) (I cannot see or find any game). (Bunbury dialect.)

The ablative is expressed by affixing āl to the nominative : ŋanya, "cart" -al kwējat yēni (I (with the) cart already went). (Swan dialect.)

Examples of Noun Declensions.

Nominative.	Yūŋār maia-k-al (k inserted for sake of euphony) yēnin ; (or) yūnar maia-g-āt yēni (man (to the) hut came). (Vasse.)
Genitive.	Āle yūŋārāŋ būrŋa (that is a man's stick). (Swan.)
Dative.	ŋaija "kālda" yūpārāk yāŋi (I "sea mullet" to man gave). (Swan.)
Accusative.	ŋaija yūpārīn jīŋoŋin (I a man saw). (Swan.)
Ablative.	Yūpār-al-wāra bōmi (man female kangaroo killed). (Vasse.)

Sex (or Gender).

Sex is distinguished in the human family and some animals by different words, as: *yupar* (man), *yōga* (woman), *yōn'gar* (male kangaroo), *wāra* (female kangaroo). Usually, however, sex is distinguished by the addition of a word signifying mother, father, as: *dwērda māmān* (dog father, "father dog"), *dwērda paŋ'ga* (mother dog). (Swan, Bunbury, etc.)

It has been stated that the Western Australian dialects contain no general terms. This is, however, contradicted by numerous examples, but, as a rule, the aborigines prefer the individual name to the general:—

Dāja, *flesh food of all kinds*. (Swan, Bunbury, York, etc.)

Mār'ain, *vegetable food of all kinds*. (Swan, Bunbury, York, etc.)

Jer'da, *bird*. (Swan, Bunbury, York, etc.)

Jil'ba, *grass*. (Swan, Bunbury, York, etc.)

PARTICLES.

Particles are employed in various positions. *Kanā'* (expressive of "or not") is in frequent use: *kāla mālyarin kana?* ((is the) fire blazing or not?), *kāl' dū'gārngū kana?* ((is the) fire made or not?), *Kārgātā yēnin kanā* (Perth going (to) or not). (Vasse, Bunbury, etc.)

The termination *mit* or *mitch* is used frequently as follows: *bārl bārōy mitch* (sometimes contracted into *bārl bār'ōmitch*), (catching hold of things and taking them away = stealing), *nūnda kūl'yāmitch* (you lie telling), *kal jīdamitch* (fire sparks making). (Swan, Vasse, etc.)

Īja or *itch* is another particle signifying "put it down," or "it is put down"; *Bwōka pābōy* (cover (with kangaroo skin) cloak), *pābōy itch* (it is covered), *bāli ĩja* (turn it over), *bārōy pardar ĩj* (fetch it down). (Swan, Vasse, etc.)

Āḥin, *ōḥin*, are used in the sense of "getting," "becoming," or "having," as *gūrt gwāb ōḥin* (merry, heart "having good," Murray River); *mīnyarn ōḥin* (dewy, having dew). (Gingin.) *pūn' pūn' dōrdōk ōḥin* (contracted from *pūn'dain pūn'dain dōrdōk ōḥin*) ((I have been) lying down, getting better (or alive) now). (Vasse.)

Wā is used as an interrogation, as: *Yūn'ar wā* (men where), *Dāja wā* (game where), *wānā wā* (woman's stick where). (Swan.) (The ordinary term for where is *winjal*, which becomes *pūnjäl* at Gingin.)

ADJECTIVES.

The following examples show how comparison is expressed:—

Gwāḥa, *good*. (Swan, Bunbury, Vasse.)

Gwāḥa-gwāḥa, *very good*. (Swan, Bunbury, Vasse.)

Gwabalitch or *gwābajil*, *best*.

ḡwiri, *good*. (Dunan dialect, Capel.)

ḡwiri-ḡwiri, *very good*. (Dunan dialect, Capel.)

Gwâb, *good*. (Katanning.)

Gwâbärt, *very good*; or Gwâbadäk. (Katanning.)

Kwâb, *good*. (Esperance, also Kaiali wongi.)

Kwâbadäk, *very good*. (Esperance, also Kaiali wongi.)

NUMBER.

There are three numbers: singular, dual, and plural. (The duals may be observed in the pronominal sentences attached.)

Plural.

The plural is generally formed by the addition of măn, găr, âb, a, găra, âk, etc. If the singular end in a vowel măn is usually added, as yôga (woman), yôgamăn (women), nôba (child), nôbamăn (children); mămăn (father), mamangăr (fathers), găniŋ (blood relation), găniŋ-gur (blood relations), ɣoy'ăŋ (relation in law), ɣoy'ăŋ-găr (relations in law), mōran (kinship term) mōrangăr.

In all the forms the relationship of the persons speaking or spoken to is denoted. These persons will be relatives, or relatives-in-law respectively. None of the equivalents of the inclusive and exclusive duals and plurals will be used in speaking of strangers.

PRONOUNS.

There is a close relationship in the pronouns of every known dialect in the State. So pronounced is this kinship also with the pronouns of the Dravidian dialects that several examples of pronominal sentences—showing the position and use of the pronouns—are appended, for purposes of inquiry.

A general view only of the south-western pronouns can be given.

PRONOUNS.—GENERAL VIEW.

(South-western dialects.)

First Person.

Singular.

Nominative.	ɣaija, ɣanya, ɣainya (<i>I</i>).
Possessive.	ɣăna, ɣăn, ɣănăŋ (<i>mine</i>).
Objective.	ɣanya, ɣainya (<i>me</i>).

Second Person.

Nominative.	Nunda, nyina, nyinök, yinok (<i>you</i>).
Possessive.	Nūnōŋ, nyūnōŋ, nūna, nūnök (<i>yours</i>).
Objective.	Nunda, nyina, nyinok, yinok (<i>you</i>).

Third Person.

Nominative.	bal (<i>he</i>).
Possessive.	băla, bălăŋ, bălăk, bągŭlăŋ (<i>his</i>).
Objective.	bal, balin, balain (<i>him</i>).

Duals. General View.

First Person.

We (inclusive), ɣǎnaija, ɣel, ɣela, ɣǎnaitch, ɣǎla.

We (exclusive), ɣali, ɣanam, ɣǎrneɣ, ɣǎrniɣ.

Plural. (Possessive.)

First Person.

Ours (inclusive), ɣǎla, ɣǎlaga, ɣǎladǎk, ɣǎlǎɣ-ɣǎlǎɣ, ɣalago, ɣǎnaijǎɣ.

Ours (exclusive), ɣǎlǎɣal, ɣǎlǎk, ɣǎrnǎnǎɣ, ɣǎlabǎlak.

Dual.

Second Person.

Ye or *you*, no'bal, nyubal, nulal, nyinagǎt, nǎ'ra, nyūram, no'bin, nūram.

Plural.

Second Person.

Ye or *you*, nurerl, nurǎl, nyuroɣ, nyurarl, nyerɣn, nyinagǎt, nuramǎk, nǎɣal, nyubala.

Plural. (Possessive.)

Yours, nūnolǎɣ, nūnok, ɣunok.

Dual.

Third Person.

They, them, balgǎp, bulǎl, bǎlǎm.

Plural.

Third Person.

They, them, balgǎp, bǎlubu.

Theirs, balgobǎɣ, balgobǎk, balgūrnoɣ.

My fire, ɣanǎɣ kala, ɣǎn kal.

Our fire, ɣǎloɣ kala, ɣǎnaijǎɣ kala.

Our fire, ɣǎla kala, ɣǎnoɣ kala.

Your fire, nunok kala, yinok kala, nūnoɣ kala.

Their fire, balgobǎɣ kala.

The relationship understood by the dual terms in the Swan district dialect was as follows:

We two (inclusive) (brother and sister) ɣǎnaij.

„ „ „ (sisters), ɣel.

„ „ (children of one father different mothers), ɣela, ɣǎla, ɣarla.

„ „ (aunt and niece) (father's sister and brother's daughter), ɣǎla.

„ „ „ „ (exclusive), ɣali.

„ „ (father and son) „ ɣǎlǎk.

„ „ (sisters) „ ɣǎrneɣ.

„ „ (man and wife) „ ɣǎrnɣlchen, ɣǎrnɣkɣn.

Ye two (brother and sister), nobal.

„ „ (man and wife), nyubal, nyubin, noḃin.

„ „ (uncle and nephew, mother's brother and sister's son), buläl'.

„ „ (bäḃingär—friends—brothers-in-law), nyinagät, nuram.

„ „ (sisters or brothers), nōräk.

„ „ (parent and child), buläl'i.

They two (man and wife, sisters, brothers), balgäp.

„ „ (brothers-in-law), būlam.

Plural.

We three (or more) (inclusive) (brothers-in-law), ḡärnan.

„ „ „ „ (brothers, wives, sisters), ḡälädäk.

„ „ „ „ (brothers), ḡela-ḡela.

„ „ „ „ (brothers), ḡäñij wâl.

„ „ (mother's brother and sister's son), ♂ sp., ḡälam.

We (inclusive) (all our families in camp), ḡäla-ḡäla.

We (exclusive) (one camp of mūrärt (relatives)), ḡalagät.

„ „ (friends—bäḃingär), ḡälädid, ḡaladit.

Ye or you (all mūrärt), nurer.

Ye or you (friends), nyinagät.

Ye or you (father's fathers and son's sons), nyubala, dēḡäm wâl.

They, balgäp.

Ours (inclusive) (husband, wife, sisters, etc.), ḡäḡi wâlök.

„ (brothers and sisters), ḡäḡi wâlök.

„ „ „ „ ḡänaijḡ.

Ours (exclusive) (mother and children), ḡälök.

Yours, nunoḡ.

Theirs, balgobḡ.

It will be noticed that the same term is sometimes used for dual, trial, and plural; it cannot, therefore, strictly be a dual.

A similar word is also often used to express different sets of relationships, as ḡälädäk (brothers and sisters), and ḡälädäk (all the members of one family including brothers, sisters, father, mother, etc.).

In the Swan district, ḡänaij means "we two" (brother and sister inclusive), and in the Capel and Vasse districts the same term means "we two" (husband and wife inclusive).

Pronominal sentences in the Swan district dialect.

I am ill, ḡanya mindaitch, ḡainya mindaitch.

I am not afraid of you, ḡaija nunök we-yen-bärt.

I you afraid not.

Give me, ḡani yōḡa (me give).

She is my wife, bal ḡäna kōrda.

she my wife.

That is mine, ăle ɲăna.
that mine.

Where are you going ? yinok winjal kulij ? (you where going ?).

Where are your children ? nunök kulöɲăra winjal ?
your children where ?

Is that your daughter ? alejăk nuna kwerărt ?
that your daughter ?

We (all the family) live together, bulă'răɲ didangăra.
all of us living together.

Whose dog is that ? nyin ăle dwerda ? (whose that dog ?)

Why do you laugh ? yinök naitch-a-kaua ?
you what or why laugh ?

This is my friend, niĵăk ɲăna kûböɲ.
this my friend.

We play like kangaroos, ɲăla yongar yongar wăba.
We kangaroo kangaroo play.

I am your friend, ɲainya nunok băhin (I your friend).

Who are you ? yinök ɲin ? (you who ?)

What family, branch, "stock" are you ? yinök măt a naitch ?
your "stock" what ?

What is your name ? yinök kwela naitch ? (your name what ?)

She is my mother, bal ɲăna 'nkan (she my mother).

Are we coming near a camp ? guti ɲălok yeya maia bărdok ?
are (?) we now house near ?

Go and tell him, bal gul wăngain (him go tell).

To-morrow I will come again, benăɲ ɲan' kûlij (morning I come).

You speak our "voice" (talk, speech) well, nyina wangă maiă gwăb.
you talk speech good.

He is my brother, bal ɲundăn.

Where do you come from ? yinok winjoɲ kûlan ?
you where come ?

They are coming, yeya yuăl kûlij (already coming).

You are a coward, yinok wē-a-wē (you coward).

He is dead, bal wenat (he dead).

He is my father, bal ɲana mām (he my father).

Give me some food, marain yöɲa (food give).

Sentences from the Gingin district dialect.

That is my brother, bali ɲana ɲundărn.

Where are your children ? nyuno kulangur ɲunjal ?

Where do you come from ? nyundo ɲunĵăɲ gûlböɲ wöɲ ?

They are coming, ye-yi yul barduk gul bardij.

Where is your fire ? nyuno kala ɲunjal ?

You are a coward, nyundo waien-waien (you afraid afraid).

He is dead, bal wârdöy.

He is my father, balia pana mäman.

Give me some food, mairain yäya.

I am your friend, paiju nyundo bähin.

Give me, pana yäya.

I am going away now, paiju wulba gulbardiy.

Where has he gone? bal punjal gulberäy?

Who killed him? pandu jänäy?

You killed him? nyundo jänäy?

You are lazy, nyundo bidi bähä.

Listen to me, yâ'la kăřitch.

His fire place, his home, bal kala găřäk.

I shall sleep now, ye-yi paiju gundain.

You stay here, nyundo nyī'ak nyīnain.

Who is that? pandu baliäk?

We two (man and wife) are at our camp, päla kurdar kälök.

Where is your husband? nyuno kardo punjal?

We two (sisters), gēla.

You have, nyūndu găřäk.

Our own country, päläru bujur.

That is he, bali bal.

That is mine, bali päna.

Where are you going? nyūndu pūnjal gūlbärdiy?

Who is that? pāndu baliäk?

Variations in Gingin dialect as compared to the Swan, Murray River, Bunbury, etc., dialects:—

The addition of the initial b to the equivalent for "that," äle (Swan), bali (Gingin); the substitution of pu for wi, in "where," winjal (Swan), punjal (Gingin); the changes of the initial d to j, däḥän (to pick up) (Swan), jähän (to pick up) (Gingin), and the changes from ö to ā, as yōga (woman) (Swan), yāgo (Gingin), korda (husband or wife) (Swan), kārdo (Gingin), kōngän (mother's brother) (Swan), kangän (Gingin), are some of the variations.

Pronominal sentences.

(N.E. Albany.)

We two (husband and wife), pärnitch.

We two (sisters), päiljer.

We will all go away, päilbäl wât gulij.

You give it, nyīnok yōpin.

He is my father, bol pan' mām.

Where is your country? nyindäk bujur wâ?

You are very good, nyundäk gwâba dāk.

That is he, äle bal.

Albany, Esperance, etc.

Where is your country? nyinök käl winjal? (your fire, where?).

We two (sisters), paläk.

You are very good, nyinök gwâb.

He is my father, bal pän măn.

You give me, nyinök pän yöy.
you me give.

Give me some (vegetable) food, mērin pän yăy.
food me give.

Is that your daughter? äle yinök nöb?

I do not know, pain kätitch bärt.
I know not.

You go, nyinök gül.

Give it to him, nīy bāriy nyöy.

You ask for it, nyindäk-al-wönk.

Swan River dialect.

I am going away now, pana kwējat kulert.

Where has he gone? winjal bal gulert?

Who killed him? nin älejäk būngert?

You killed him, nundok bungert.

You are lazy, yinok bita bab.

Listen to me, painya kätaitch.

His home (hearth), bala kal.

I shall sleep now, painya kwēja bijar gunda.

You stay here, yinok nījok nyīna.

Where is your husband? nunok korda winjal?

A few pronominal sentences from the Katanning dialect show the slight variations in the pronouns:—

He is my brother, bal panăy gunt.

Where are your children? nyinok kuloy winjal?

Where do you come from? yinok winjoy guliŋ?

They are coming, bula yuäl guliŋ.

Where is your fire (home)? nyinok kal winjal?

You are a coward, nyinok waiäk.

He is dead, bal wēniŋ.

He is my father, bal pän măn.

Give me some food, mērin pän yăy.

I am your friend, pain yinok bāhin.

Give me, pan yöy.

I am going away now, pain wât guliŋ.

Where is he going, or where has he gone? winjal bal guliŋ?
Who killed him? ɣin werdamin?
You killed him, nyinök bōmin.
You are lazy, ɣinök yumärn.
Listen to me, ɣain kätitch.
I will give you if you give me, ɣaijela nin yago aliŋ nyon.
I will come presently, bārda kuliŋ ɣāna.
presently come me
Perhaps I might come (or go), junakɣain kuliŋ-a-na.
Give it to him, niŋ bārŋ nyon.
You ask, nyindāk-al-wank.

VERBS.

The verb in the southern dialects is exceedingly simple. The preterite is nearly always formed by the addition of *ga*, the present participle by adding *in*, *iŋ* to the present tense. A vowel and occasionally a consonant is sometimes interposed at the junction.

Verb, to go. (Swan River, Bunbury, etc.)

Present Tense.

I go, ɣanya yēniŋ.
Thou goest, nyinok yēna.
He goes, bal yēniŋ.
We (two sisters) go, ɣela yenŋ.
Ye (two sisters) go, nō'ra yēniŋ.
They go, bułam yēna, buła yēna.
 (Yēniŋ and yēna appear to be alternative forms that may be used indiscriminately.)

Preterite.

I went (an indefinite time ago) { kurā' ɣanya yēna ga.
 wura' ɣanya yēna ga.
I went (a little while ago), kārām ɣanya yenaga.
I went (yesterday), karanya ɣanya yēnaga.
I went (this morning), ɣanya gētalgāp yenaga.
I went again, ɣanya kōr yenaga.

Future Tense.

I will go (to-day, now), ɣanya yēyi yēniŋ.
I will go (to-morrow), ɣanya mai-er-āk-a-yēni.
I will go (at daylight), ɣanya bēniŋ kor' yēni.
I will go (by-and-by, a long time hence), ɣanya mīla yēniŋ.
I will go (to-night or in the night), ɣanya bārda gidalyāk á yēnin.

Conditional.

Perhaps I will go, kăḥain ḡan' yēni.

Imperative.

Go, wât-o-yēṇain, mūn yēna, wâṭi yen.

Go away, wât gul.

Go not, yēṇardăp.

Go quickly, gertgert yēna.

ADVERBS. (Swan, Bunbury, etc.)

The following is a list of the commonest and most useful adverbs in the south-west:—

Again, kôr, kôr.

After, wūla gât.

Before, kwējăgat.

Here, nyî.

There, bôkôja.

Far away, wurăṭ'.

How many, nălin.

Just now, yē'ya.

By-and-by, būrda.

Low, ḡărdi, ḡardăk.

High, yîra.

Slowly, dăḥăkăn.

Quickly, gërt-gërt.

Enough, kēnyăk.

Close, near, bôrdăk.

Where, winjal, ḡunjal, wâ.

No, bărt, yuăṭ, kaiăn.

Yes, kaia, kô.

Perhaps, kăḥain.

Truly, kărnijel, būndijel.

The adverb is usually placed before the verb, as *nyîṇa winjal kulij?* you where go?

PREPOSITIONS. (Swan, Bunbury, etc.)

Prepositions are few in number, and are generally placed after the substantive as pronouns:—

On, il.

In, within, inside, into, bwăra, bwâra, būra, bôra.

Between, karda.

With, yêl.

Without, bărt, dărt.

Examples.

Go inside the hut, maia bwăra gûl.
hut inside go.

Smear (body) with fat or grease, boyn yel năḥain.
grease with smear

(The) meat (is) on top (of the tree), dăj ijil.
meat on top.

By, appears to be rendered by affixing *al, el, il, ul*, to the nominative case of the substantive as pronouns:—

I walk by the sea, ḡain wăḍărn-al-kûlij.
I sea by the walk.

I go by the beach, wâdärn-al-nāra painkūlin.
 sea by beach I walk.

CONJUNCTIONS. (Swan, Bunbury, Gingin.)

There are very few conjunctions in the south-western dialects :—

And, wē, gǎji.

Or, kā.

If, bainya.

Wulbēr and Dūl will go presently. Wulbēr wē Dul gūliji būrda.
 Wulber and Dul go presently.

Yours and mine, nūnōp gǎji pānāp.
 yours and mine.

Are you going or am I? nyinā-ka-gulip pain gūlip?
 you are going I going?

If I had some meat I would bring it and give it to you, Bainya paija dāja
 If I meat
 gātägūl nūna yōpin.
 had gone and fetched you give (I should).

INTERJECTIONS. (Swan, Bunbury, etc.)

Indeed! nyā! (ny as in Señor).

Oh! ah! nā!

Strangers! jī!

Surprise or pleasure (expression of), kai!

NUMERALS.

One, two, three, have special names applied to them. Four is sometimes denoted by a repetition of two : kujāra-kujāra, 2-2 = 4; but it is doubtful whether this is a purely native term. The southern coastal people also appeared to use the equivalents of "hand" and "foot" for purposes of enumeration, as māra gēn (hand one = 5), jēna gēn (foot one = 5), māra kūjal (hands two = 10), jēna kūjal (feet two = 10). These terms are, however, not used in the south-west inland districts, and it may be surmised that they have been introduced by white settlers; but the southern coastal natives use two other terms for five which appear to be distinctly native. These are mara bāli ("that hand" or "hand that"), meaning five men, mara gēba, five birds.

In the southern dialects also an indefinite number of fighting men in a tribe was denoted by the terms mīra gēn (throwing board one), mīra kūjal (throwing board two). When asked how many natives might be included in these terms the reply was, "just like the white man's sheep."

Companies of soldiers were alluded to as mīra gen, and it was evident that the above terms were only used to express the available fighting men. When a native wished to impress his opponent with the number of fighting men he could call to

his assistance in a battle he used the term *mīra gēn* (I've got many "throwing boards": fighting men). His opponent would probably reply that *his* tribe had *mīra kujal* (twice as many *mīros*).

An indefinite number of *kailis* (boomerangs) was alluded to as *mībēra gen* (one bundle of *kailis*); *bunārak* is the general term for "bundle." Ordinarily the term *būla* means any number beyond three. The equivalents for "one" are: *gēn* (Swan), *gān* (Gingin), *gēyēniḡ* (Dunan dialect—Capel), *dūmbart* (Murray), *kain* (Kaiali wongi), *gēn* (Katanning), *gēn* (Esperance, Albany).

Two is *kujal* (Swan, Williams, Gingin, Katanning, Albany), *kārdūra* (Capel—Dunan wongi).

Three: *Mo*, *mardip*, *mardain* (Vasse, Williams River, Avon River), *wār-ōḡ* (Swan), *mau-ain* (Gingin), *mau* (Victoria Plains), *ḡārāl* (Capel district—Dunan wongi).

It will be noted that the Dunan dialect appears to be distinct from all the other southern and south-western dialects. It was only spoken in the districts now called Capel and Wonnerūp, being therefore confined to a very narrow area. It was not spoken by the Vasse or Bunbury tribes, although it was understood by them. (The equivalent for "two" is, with slight variations, found throughout all the known dialects of Western Australia: *Kujal*, *Kujāra* (Esperance, Albany, Bunbury, Swan, Gingin, Katanning, etc., etc.), *Wūlai'a* (Berkshire Valley, Dandarraga, etc.), *Kūd, āra* (Kūdharra), (Kalgoorlie, Laverton, and Eastern goldfields, also Murchison, Gascoyne, Ashburton, Fortescue, etc., etc.), *Kūjāra* (Broome), *Kujār* (Beagle Bay).)

VARIATIONS IN DIALECTS.

Some examples.

Gingin dialect.—*Bāli* (that), *ḡūnjal* (where), *jāḡān* (to bring), *yāgo* (woman), *kāngun* (mother's brother), *kardo* (wife or husband), *jinga* (white man or spirit), *ḡāngān* (mother).

Victoria Plains dialect.—*Äle* (that), *winji* (where), *dābāt* (to fetch or bring), *yōga* (woman), *kōngan* (mother's brother), *korda* (wife or husband), *noyja*, *nyitḡ* (white man or spirit), *ḡangan* (mother).

Swan River dialect (Guildford, Cannington, etc.).—*Älējāk* (that), *winjal* (where), *dābāt* (to fetch or bring), *yōga* (woman), *kōngan* (mother's brother), *körda* (wife or husband), *janga* (white man or spirit), *'n-kan*, *ḡangan* (mother).

Swan River, Perth, Fremantle.—*Äle* (that), *winjal* (where), *dābāt* (to bring, or pick up), *yōga* (woman), *kōngan* (mother's brother), *körda* (wife or husband), *jenga* (white man or spirit), *'nkan*, *ḡanga* (mother).

York and Beverley dialect.—*Äle* (that), *winjal* (where), *dābāt* (to fetch or bring), *yōg'* (woman), *kon'gan* (mother's brother), *körd* (wife or husband), *kājin*, *nyitḡ* (white man or spirit), *'nkān*, *gaiāḡ* (mother).

Meckering and Grass Valley dialect.—*Äle* (that), *winji* (where), *dābāt* (to fetch or bring), *yōga* (woman), *kōngan* (mother's brother), *korda* (husband or wife), *jenga* *ḡū-yü-wer* (white man or spirit), *'nkan*, *ḡanga* (mother).

Murray River district dialect.—Yāla (that), winji (where), yūgodin (to fall down), yāgo (woman), kangun (mother's brother), kardu (wife or husband), janga (white man or spirit), ngangan (mother), bārōy (to bring or pick up).

Capel district dialect.—Āla (that), injal (where), yūgāt wānagār (to fall down), yago (woman), gāmānāy, gāma (mother's brother), mī-ēr-āk (wife), jinga (white man or spirit), gaienāy (mother), dābālga (to pick up).

Bunbury and Vasse dialect.—Āle (that), winjal (where), yukāt gwert (to fall down), yoga (woman), kongan (mother's brother), korda (wife or husband), janga (white man or spirit), ngangan (mother), bārōn (to pick up).

Williams River dialect.—Āle (that), winjal (where), dābāt (to fall down), yög, yök (woman), kongan (mother's brother), korda (wife or husband), jan'ga (white man or spirit), gank (mother), bārōy (to pick up).

Blackwood and Bridgetown dialect.—Āle (that), winjal (where), kūlo wāndin (to fall down), yög (woman), konk (mother's brother), kord (wife or husband), gū yū wār, nyitiy, janāk (white man or spirit), 'kan, gank (mother), bārīār ōgin (to pick up).

Katanning district dialect.—Āle (that), winjal (where), dābātiy (to fall down), yög (woman), konk (mother's brother), kōrd (wife or husband), gū yū wār, jānāk, nyitiy (white man or spirit), 'n'ga, 'kan, gank, gaiāy (mother), bārōgāt (to bring).

Kendenup district dialect.—Āle (that), winjal (where), kulāy gunditch (to fall down), yog (woman), konk (mother's brother), kord (wife or husband), gu yu wār (white man or spirit), kaiāy (mother), bārōngulat (to bring).

Albany district dialect.—Āle (that), winjal (where), gula gūntgār (to fall down), yog (woman), konk (mother's brother), kord (wife or husband), mīrāk (wife), dulgaitch, nyitiāy (white man or spirit), gank, gaiāy (mother), bārōy gūlātiy (to pick up).

Mount Barker district dialect.—Āle (that), winjal, winjāy (where), kula gunt (to fall down), yog (woman), konk (mother's brother), kord (wife or husband), dulgoytch (white man or spirit), gank (mother), bārōngulat (to bring).

Jeramungup district dialect.—Āle (that), winjal (where), būrnin dōgāngain (to fall down), yok (woman), kongan (mother's brother), kord (wife or husband), guyu wer, janāk (white man or spirit), gānk, 'kan, kaiāy (mother), bārōy (to pick up).

Esperance district dialect.—Āle (that), winjal (where), kūla gunt (to fall down), yog (woman), konk (mother's brother), kord (wife or husband), jānāk, gātā, guyu wer (white man or spirit), kaiāy, gaiāy (mother), bārōy (to bring).

The sentences herewith attached are the exact equivalents given by the natives for the words they express, and may serve to show the grammatical structures of south-western dialects—

As ugly as a water rat (like (a) water rat), dāran (rat) mākin (like). (Vasse.)

All (everyone) talking, yuāl' wōnga. (Vasse.)

coming talking.

Answering each other, yuāl' man-a-wōngin. (Vasse.)

coming to talk.

An expression equivalent to "serve him right," gē. (Dunan wongi.)

A quiet, still evening, burīp. (Dunan wongi.)

All together, gūlyāra. (Dunan wongi.)

All at once, bulyāru. (Dunan wongi.)

A loose (or immoral) woman's camp, bīma būla. (Dunan wongi.)
"back" many.

Search for that boomerang, yīlījin kila. (Dunan wongi.)
look for boomerang.

Bring me, yual' göṇa. (Dunan wongi.)
come (and) bring.

Any fish in the river (or water)? dājā wā gābälā? (Bunbury, Mandura.)
fish where water?

(My) arm (is) a little stiff, mārāk būriṇ gwert. (Williams.)
arm "making."

At home, at my camp, kālök. (Gingin.)
fire at.

Are you hungry? nūno wērat? (Swan, Guildford.)
you hungry?

A "white man" is coming, "janga" yäl-ai-yāniṇ. (Vasse.)

A number of natives going "picnicking," nyūṇar būla "dūlyöpin."

Bring spears here quickly, giṇ yuäl gātagul. (Swan.)
spear bring quickly.

Bringing him back again, yül gāṭiṇ kāro. (Swan.)
bringing back again.

Coming in the dark, māṇerdāk yēnin. (Pinjarra.)
dark coming.

The dog will lick it, dwārdägā dālāṇ. (Dunan wongi.)
dog will tongue having make or lick with.

The eaglehawk flew away into the clouds, wālitch (eaglehawk) mar-a-bāṇiṇ
(mar—clouds). (Beverley.)

Give me fire (matches), kāla yöṇa. (Guildford, Swan.)
fire give.

Go and dig a grave, gūl binṇ mōta. (York, Beverley.)
go dig grave.

Hold in the hand, mara būṛöṇ. (Swan.)
hand catch hold.

Having a merry heart, gūrt gwāb öḃin. (Murray River.)
heart good having.

Having no appetite, moyer bārt (moyer, liver) bārt (nothing, no).
liver nothing.

A birthmark, gen (one) berrgen (mark?) nyīni (sat down).

I hear you, I have ears, kăṭaik nyīnain, jūn gök.

listen (sitting) (ears have).

I never got it, ɲaiju kaian găṭāk.

I "nothing got."

(I will) *get angry*, gārāŋ-a-bāk. (Gingin.)

angry will get.

(I have been) *sitting enough*, (will) *go away*, kenŷāk nyīna, wât-a-gül. (Swan.)

enough sitting, go away. (Perth.)

He speared (the fish), bal gij-al-dōŋgar. (Dunan wongi.)

he spear with hit.

I am going to my sister's fire, jigāŋ kala yāŋiŋ. (Dunan wongi.)

sister's fire going.

Is it white man or black fellow? jinga-ga-yūpārä? (Dunan wongi.)

white man or native?

I am telling the truth, ɲaija kārniŷel wōŋga.

I true speak.

I have come for nothing, ārda yēnin; gīna yēnin. (Vasse.)

nothing come (for); nothing come (for).

I hear whistling, dwōŋ dālīŋ. (Vasse.)

hear "tongue sound."

Joking, jesting, "that's only a story," gīna bardibin. (Vasse.)

"just" (?) (a) story.

Kill (him and hide body) *in Estuary*, bōma dārbälōpa. (Murray River.)

kill Estuary (put in). (Pinjarra.)

Killing with a boomerang, bom dārt kēlāk. (Williams River.)

killing (or killed) (with) kēl.

Leave it down there, āli-bal ija. (Vasse.)

that put there.

My children can play with him, ɲāna kūlongār wāhain bal. (Gingin.)

my children play (with) him.

Mend my cloak quickly, gērt gērt darnil bwök. (Williams River.)

quickly mend skin cloak.

Mending cloak with kangaroo sinew, jandarniŋ gira-k-al. (Gingin.)

mending sinew with.

The moon is making his hut (in preparation for rain, "halo" round moon),
mikög maia bāmip. (Beverley and York.)

moon hut making.

Daylight (or morning) *is coming*, bēn yuāl gülīŋ. (Beverley and York.)

morning is coming.

Perhaps someone ate it and went away, kāhain ɲin ɲāna kūlert. (Swan.)

perhaps who ate went.
(someone)

Paperbark bring (to make vessel), yūmbāk-āl-boma yuāl gāṭa. (Swan.)

paperbark cut and bring.

Pick up the littlest one, yōban hărăṇ. (Vasse.)
smallest pick or bring.

Pick up the littlest one, bījurdin dāhan. (Dunan wongi.)
smallest pick up.

Pick up the littlest one, bātuin jaḥān. (Gingin.)
smallest pick up or bring.

Rain always falling and teasing or wetting you, gaḥ-al-gū' ān bōmīṇ. (Swan.)
rain falling and hitting.

Sing (or say) it again, Kōra gēnji. (Gingin.)
again one "do."

"Sister-in-law" come here (♀ speaking), dini yūl yēṇa. (Murray River.)
Sister-in-law come here. (Pinjarra.)

The sun is very hot, mūnāk-īl-yāyār. (Vasse.)
Sun's heat!

He has just died, kwājāt bu' wēn. (Murray.)
directly he or it died. (Pinjarra.)

The children are playing over there, bōkāl wāḥerdīṇ kūlōyār. (Swan, Perth.)
there playing children.

That native gave it to me, ālā yūṇārāk yūṇi. (Dunan wongi.)
that native it gave.

To-morrow morning you will see me again, bēnāy kór jīṇāy. (Swan, Perth.)
morning again see.

This is my "friend", nījāk ṇāṇa kūbōy. (Swan, Guildford.)
this (or) here my friend.

Take (or fetch) it down, bāroy ḡarda īj. (York, Beverley.)
fetch down and put.

Very pretty face, mīnaitch ḡūrāy 'ḡūrā'. (Gingin.)

"Venus" tells us daylight is coming, "tīan" bēṇa kwejat kulert. (Swan, Guildford.)
"Venus" daylight directly coming.

What is the other man's name? nuna jēṇa wōṇa nāy? (Vasse.)
your foot other what?

What do you come for? nau' a - yēṇiṇ? (Vasse.)
what for coming or come?

What is that? bāliak naitch? (Gingin.)
that what?

A few examples of words from various localities spelled and pronounced somewhat alike, but generally differing in meaning :—

Bā'lū, *string*. (Murray River.)

Bā'lū, *belt of human hair or opossum fur*. (Broome) (North-west.)

Bā'lū, *tree or wood*. (Broome.)

Bāṭa, *rushes*. (Swan, Perth.)

Bāṭa, *sun*. (Gingin.)

Bībī, *breasts, milk.* (Vasse, Swan, York.)

Bībī, *breasts.* (Ashburton, Gascoyne.)

Bībī, *mother.* (Broome.)

Bibitha, *mother.* (Ninghan district, N.E. Gingin.)

Bīga, *shade.* (Broome.)

Bīga, *gum.* (Vasse.)

Bīga, *sick, ill.* (Murchison.)

Bīla, *sky.* (Lake Nabberoo, Upper Murchison.)

Bīla, *spinifex.* (Laverton district, E. Goldfields.)

Bīla, *river.* (Vasse, Murray, Swan.)

Bājōṅ, *edible gum.* (Gingin), also tree from which gum is obtained.

Bājōṅ, *matter from boil, "pus."* (Swan, Perth.)

Bājōṅ wongi, name given to Augusta and Warren River dialects.

Darndo, *large white gull.* (Swan.)

Darndo, dōndārn, *fish hawk.* (Swan and Vasse.)

Dörnda, *light coloured.* (Swan, Williams River, Victoria Plains.)

Dörnt, möḥ dornt, *half-caste.* (Avon River.)

Döndir, *half-caste.* (Capel—Dunan wongi.)

(Tōndarāp = name of one of the four South-western Class Divisions in Manitchmat phratry.) (See Para. 1, p. 65.)

Didāra, *the middle.* (Murray River.)

Didara, *the sea.* (Vasse and Capel.)

Diḍara, *hornet.* (Swan.)

Didār, *plover or quail.* (Bridgetown.)

Didār, *spear.* (Bremer Bay.)

(Dīdārāk = name of one of the four South-western matrimonial classes or Class Divisions in Manitchmat phratry.)

Jūari, *red ochre.* (Norseman district.)

Jūari, *deud, dead body.* (Broome.)

Jūari, *sister-in-law* (♀ speaking). (Murchison.)

Jūkan, *name of Broome district dialect.* ("Jukan pängä" "Jukan speech.")

Jūkan, *sister.* (South-west, Swan, Bunbury, etc.)

Kaian, *no.* (Gingin.)

Kaian, *cold.* (Norseman.)

Kēla, *porpoise.* (Vasse.)

Kēla, *boomerang.* (Vasse.)

THE ANTIQUITY OF MAN IN IRELAND, BEING AN ACCOUNT OF THE OLDER SERIES OF IRISH FLINT IMPLEMENTS.

By W. J. KNOWLES, M.R.I.A.

INTRODUCTION.

IRISH flint and stone implements are considered by antiquaries generally to be all of neolithic age, and although I divide them into an older and a newer series, I do not mean to infer that the older series are the equivalents of the palaeolithic implements of Chellean and Acheulean type found in France and the south of England. They may be even older than these implements, or they may be only an early and peculiar kind of neolithic implements.

The older series consists largely of flakes together with a considerable number of cores and some rude implements. The flakes as a rule are coarse and heavy, though some small and well-formed flakes have been found. Many of the large and coarse flakes are narrow, rather tending to a blunt point at the bulb, and they are broad and heavy at the opposite end. The implements are of several kinds, such as knives, scrapers, picks, choppers, and large hand weapons. All have a deeply weathered crust, showing the flint altered in texture and appearance to the depth of an eighth of an inch in many cases. The surface is glazed and very hard, but the inner altered crust, when broken, is white and has a hackly fracture, presenting much the same appearance as the inner substance of broken delf. The colour of the outer surface of these weathered flints is mostly white or cream, but others are yellow, reddish-yellow, or bluish-black. The flakes and implements of whitish patination are most common in the gravels of the raised beach at Larne, County Antrim, while those which are highly coloured are in the greatest abundance among the gravels that have been denuded and scattered by the waves on the present sea-beach. Larne, Island Magee, Magheramorne, the shores of Belfast Lough (as at Kilroot), have been manufacturing sites of the older series of Irish flint implements. Northwards of Larne, as at Carnlough, and along the north coast of Antrim, as at Whitepark Bay, we find remains of the older industry.

Larne and some neighbouring sites were the first to attract attention, owing to these older flakes and implements being found in the gravels of the raised beach at these places. In the memoir to accompany sheets 21, 28 and 29 of the Geological Survey of Ireland, we learn that during the progress of the Geological Survey in this district in 1867, the late G. V. Du Noyer discovered what he considered to be numerous flint arrowheads and other implements of palaeolithic age, in the gravels

of Larne, Magheramorne, Kilroot and Island Magee, an account of which he gave in papers to the Geological Societies of Ireland and London.¹

My acquaintance with Mr. Du Noyer's papers until lately was chiefly from such quotations as I had seen in the Geological Memoirs mentioned above, and other works, but lately I obtained access to the various journals containing his articles on the flints of the raised beach², and I consider they show remarkable insight into the subject he was dealing with, which could not be fully comprehended by anyone without reading the full accounts he has given in these papers. Until I read his articles I considered that I was the only person who held that there were an older and a newer series of stone implements in Ireland, but I found that Mr. Du Noyer also recognized a series of implements newer than those he found in the raised beach gravels. I do not refer to his calling those rude flints palaeolithic, as it was a general fault among local authors at this time to call rudely worked flints palaeolithic, and polished implements neolithic, but I refer to his recognition of two series of implements in Antrim. "One, the older series, which occurs in the marine drift, shows the implements of ruder forms with their surfaces more or less oxidized or rendered white, though they are imbedded in what was well washed and rolled sea drift. The more recent are found in the subsoil clay³ at all elevations up to 600 feet or so on the northern slopes of Cave Hill at Belfast, Commons of Carrickfergus and lofty ground around Larne Lough, including Island Magee. These more recent kinds are all characterized by a comparatively fresh look, though they all possess that porcellaneous glaze which time alone can give to the surface of a fractured flint; but they lack the whitish crust of kaolin which the flakes from the marine drift almost invariably present."

The gravels of the raised beach at Larne are stated in the Memoir of the Geological Survey already mentioned, to form a terrace, ten, fifteen, or twenty feet above high-water mark. Professor Hull, in his *Physical Geology and Geography of Ireland*, says that perhaps the best sections of the raised beach to be obtained on the Antrim coast are those which are laid open in some gravel pits near Larne Harbour, and he states that they contain flint flakes of human workmanship, and that the flints are of the rude form and finish known as palaeolithic. The highest part of the gravels would seem to have been the part passed through by the railway so as to reach Larne Harbour. The fine sections that were so long available for inspection by geologists or archaeologists can be seen no more, as the gravels have been removed by the railway companies for ballast. Thinner sections can still be seen all along the shore of Larne Lough, the shore of Island Magee opposite Larne, at several places along the eastern and northern coasts of Antrim, and at

¹ In these early days there were persons who professed to "improve" flint flakes by chipping them round the edges and making some into fantastic shapes. Some of these got into the hands of collectors about Belfast, and it is to be regretted that Mr. Du Noyer has taken illustrations for his paper from these spurious specimens.

² *Journal Geol. Soc. Ireland*, Vol. i., and *Journal Geol. Soc. London*, Vols. xxiv and xxv.

³ Mr. Du Noyer must mean the *surface* soil, as it is there we always find the newer implements, never in the subsoil. *Subsoil* is evidently a mistake for *surface soil*.

Portstewart in County Derry. The shores of Belfast Lough on both sides show sections of gravels, containing flakes and implements, varying from two or three to five feet thick, but as at Larne the thickest portion of the gravels at Kilroot have all been removed for ballast. Mr. Du Noyer remarks that when these singular flakes from the raised-beach gravels were first discovered about five years ago, their mechanical origin was questioned. He himself thought at first that they were due to natural causes, but he saw that they could only be accounted for by artificial means as they afforded clear evidence of design in their form and mode of occurrence. Mr. William Gray on April 4th, 1867, in a paper to the Field Club in Belfast, which he illustrated by a large collection of flakes, demonstrated to his audience the probability of their being natural flakes and not manufactured by man. Eventually the belief in the artificial character of the flakes became general.

POSITION OF THE FLINTS IN THE GRAVELS.

There arose a difference of opinion among the antiquaries and geologists of the Belfast Field Club as to whether the flint flakes, cores, and implements were found throughout the body of the gravels, or were confined to the surface. Mr. Du Noyer said they were found in the gravels. Professor Hull, in his *Physical Geology and Geography of Ireland*, says the raised beach at Larne was composed of stratified and waterworn gravel, with numerous bleached marine shells and flint flakes of human workmanship. He concluded that the coast had been raised since the occupation of the British Isles by the ancient Celtic tribes. Mr. Archer, of the Liverpool Geological Society, read a paper before that Society on December 14th, 1880, entitled "Notes on Worked Flints of the Raised Beach of the N.E. of Ireland," wherein he states that he found flakes in the gravels of the raised beach at Kilroot. He had a good opportunity of examining the raised beach and its contents when observing the men carting off hundreds of tons of it, and laying it alongside the railway for ballast. On another occasion he himself extracted 28 specimens of flakes, cores, etc., from undisturbed gravel.

A few archaeologists about Ballymena, including Canon Grainger, Rev. Dr. Buick, and myself, made frequent visits to Larne to examine the several sections opened up by the railway passing through the gravels. On every visit we were able to find flakes and cores at all depths in four or five long sections, which were generally 12 to 14 feet in depth. The faces of these sections were constantly renewed by the removal of gravel for ballast, and every time we visited them we found practically fresh sections. We made various contributions on the subject to the local newspapers, and I also read papers on the finds I had made to the Royal Irish Academy, the Anthropological Institute, and the British Association, in which I described the finding of flakes, etc., at all depths in the gravels. In August, 1883, there was a meeting of the Royal Historical and Archaeological Association of Ireland held in Ballymena, and I induced a number of members to accompany me to Larne to examine the open sections of the gravels. Rev. James Graves, Canon Grainger, Rev. Dr. Buick, all well-known archaeologists, Messrs.

Kinahan, Symes and McHenry, of the Geological Survey, who were also interested in archaeology were, I remember, of the party; but I believe there were others. Almost every member obtained flakes or cores at various depths in the sections. Mr. Kinahan obtained a well-marked flake at a depth of over 12 feet, and so stated in writing to the Belfast newspapers.

Notwithstanding the good sections at Larne and Kilroot, and the various reminders in newspapers and journals, that flakes and cores were found at all depths in the gravels, the archaeological members of the Field Club in and around Belfast did not take the opportunity of examining the sections, but held to the opinion that the flakes and cores were only found on the surface. In September, 1869, the Club made an excursion to Larne and Island Magee and examined the raised beach. In referring to the flint flakes the report of the visit states the gravels are "16 feet deep, yet the flakes or wrought flints are never found more than about 3 feet deep, or to such depths as they might have been conveyed by agricultural operations. They may have been the chips or refuse of a manufactory of flint arrow heads so common in this locality, or they may be even of later date, the refuse of gun flint factories." On April 24th, 1884, Mr. William Gray, in a paper read to the Field Club correcting "erroneous statements" made about the gravels and their contents, winds up by saying "Moreover the worked flints are not mixed through the gravels, but occur only on the surface of the undisturbed gravels, and therefore the men who worked the flints lived subsequent to the formation of the raised beach."¹

THE FIELD CLUB'S INVESTIGATIONS.

I understand that after the reading of Mr. Gray's paper in 1884 a Committee was appointed to investigate the raised beach gravels, and on May 26th, 1886, the investigation took place. The following is a summary from a report of the Club's proceedings. The Committee selected a site on the west side of the railway, where the escarpment was 14 feet high. The talus was cleared away leaving a clean face. Flakes and cores were found on the surface in great profusion. A space of 6 feet by 2 feet was marked off. Two workmen remained on the surface to cut the section and throw down the material, and the Committee went to the bottom to examine it. They found flakes up to 3 feet 3 inches, but after that depth no specimens which did not admit of a doubt as to their probable human origin were found. No specimens were found between 7 feet and 11 feet 6 inches, at which depth a well-formed flake was thrown out by one of the workmen. The question was raised as to the probability of this flake having fallen from the loose gravel of a higher zone against which the workmen might come in contact when standing erect."² The conclusion of the Committee after giving their opinion as to the mode of formation of the gravels, states that "a subsequent upheaval left the Curran about its present elevation. Man seems now to have appeared on the scene,

¹ *Annual Reports*, vol. ii, p. 289.

² *loc. cit.*, p. 523.

perhaps attracted either by the desirability of the place for fishing, or on account of the numerous flints contained in the gravels being found convenient and suitable for the manufacture of the rude implements which formed part of his equipment.”¹ The members of the Committee in addition to their general report were requested to express in writing their individual opinions. Six gentlemen responded, but one of them arrived just as the digging of the section was finished, and therefore could not express an opinion on that subject. The other five support the opinion that the cores and flakes were only found on the surface of the gravels. Most of these individual reports are rather lengthy, but I give the shortest one as an example: “The flakes are only found on the surface or at such depths in the gravels that prove that they were not deposited with the gravels, but were evidently manufactured after the beds had attained their present elevation.”² I took exception to the conclusions of the Sub-Committee in a paper read at a meeting of the Field Club on February 5th, 1887. There was a discussion of the paper, and the Club’s report of the meeting says: “the general impression seemed to be that in face of the statements of Mr. Knowles and those he has quoted, the report of the Sub-Committee, though perfectly unbiassed, had not absolutely set the question of the position the worked flints occupy in the gravels at rest.”³

On May 27th, 1889, a second investigation of the gravels of the raised beach took place by a Sub-Committee of the Field Club. The section was 9 feet by 5 feet and the face was 15 feet 6 inches in height. Flakes and cores were in great profusion in the uppermost gravelly soil, and were most abundant in a pebbly layer 1 foot to 1 foot 6 inches below the surface. The flakes were all of a rude type with blunt edges and the surface much oxidised—undoubted cores rare, no scrapers or other implements discovered. In the succeeding 4 feet 6 inches of gravel far fewer flakes were found, and the number was observed to diminish as the depth below the surface increased; they ceased altogether at a depth of between 4 feet and 5 feet. Then the investigators came to more gravel, which they divided into four zones, the flints from each zone being kept separate. It was noticed that flints occurred sparingly all through this bed from top to bottom. A few cores were obtained, and a fine example of a flint celt at a depth of 11 feet from the surface. It was noted that the flints were fresher and less oxidised than those of the upper gravels, and the edges sharper. In bed E, which could not be so thoroughly examined on account of water coming in, one fine flake was obtained at a depth of 19 feet from the surface. It was not oxidised, and its edges were as sharp as if it had been just struck off. Underlying this bed was the estuarine clay and associated strata in which no flakes were observed, but it is worthy of mention that in the lowest bed of gravel, at a depth of 28 feet below the surface, flint chips were obtained bearing a considerable resemblance to flakes. The conclusion of the Committee is, that “the worked flints which the gravels contain consist almost entirely of rude flakes, and occur chiefly on the surface of the deposit. They

¹ *loc. cit.*, p. 525.² *loc. cit.*, p. 526.³ *loc. cit.*, p. 542.

decrease rapidly in quantity through the upper bed of gravel and are nearly absent from the sandy layers, and in the lower gravel they occur sparingly throughout the bed down to a depth of 20 feet below the surface where the estuarine clay series begins." General satisfaction was expressed at the result of the investigation and with the thoroughness with which it was carried out.¹ I am pleased with this latter investigation and its results, but everyone must regret that the discovery that the flakes and cores were to be found throughout the gravels was so long delayed. It is reported that the Sub-Committee found during the excavation over 100 worked flints, but according to George Coffey in a paper on the same gravels read before the Royal Irish Academy on June 19th, 1904, these specimens are no longer forthcoming.²

OTHER INVESTIGATORS.

Sections of the raised beach gravels at Larne have been cut by other persons besides the Field Club, but these came so late that the best part of the gravels had been removed by the railway company. Messrs. R. Ll. Praeger and George Coffey have cut several sections at different times, some of which Mr. Coffey has erected in the National Museum. One of these sections was made in 1897. "A section was opened on the southern side of the railway cutting in the Curran close to the spot where the Field Club section was excavated in 1889." "A core was got at a depth of 4 feet, and another at a depth of 11 feet from the surface. But very few cores or flakes were got in this section except in the surface layers."³ Mr. Coffey then describes a section 5 feet deep close to the gate lodge of the aluminium works. This section has been re-erected in the museum. "During the excavation a considerable collection of flakes and cores was made, each specimen being marked at the time according to the place and depth from which it was taken. These have likewise been placed in the museum and lettered to correspond with the levels of the sections. No scrapers were found, and only one flake with secondary working."⁴ "Our experience is, and it appears to have been that of the Field Club Committee, that the flints with abraded crust occur chiefly in the upper layers, and for the most part in the disturbed surface portion. Lower down the flints are sharper and often unpatinated or only partly patinated. A large number of the flakes got in the aluminium works, were quite sharp and unpatinated." Then Mr. Coffey adds a statement which I agree with—"The sharpness and patination of the flakes seem indeed to vary considerably not only with the depth but with the part of the beach examined."⁵ Mr. Coffey describes other sections. In one place he found a bed of gravelly clay (1 foot 3 inches) resting directly on boulder clay. In this bed the flakes were found unweathered and sharp. Mr. Coffey's explanation of this is possibly the correct one—"that on the slope of the bank of boulder clay they escaped the beach action and lay as they fell from the hands of the flint

¹ *loc. cit.*, vol. iii, p. 209.

² p. 173.

³ *R.I.A. Proc.*, vol. xxv, p. 174.

⁴ *loc. cit.*, p. 174.

⁵ *loc. cit.*, p. 176.

workers, being covered up gradually as the land sank." Mr. Coffey describes another section as follows—"The only place during our examination of the gravels last Easter, at which a systematic collection of flakes was made, was the ballast pit Z. There the gravels stood 10 to 12 feet thick on the boulder clay passing into sand at the bottom. A piece 5 feet by 4 feet was taken down, care being taken to guard against flakes falling from higher level, when collecting. The disturbed surface layers here as at other points yielded great quantities of chipped and abraded flakes, not counted. After 1 foot 6 inches flakes became scarce; from 2 feet to 4 feet only 7 flakes were got; from 4 feet to 6 feet, 22 flakes and cores; from 6 feet to 8 feet 38 flakes and cores; from 8 feet to 9 feet, 22 flakes and cores; between 9 and 10 feet only 6 were found."¹

Miss Nina F. Layard, of Ipswich, made her acquaintance with the Larne flakes and cores in the following way. While waiting for the boat at Larne in October, 1908, she and her friend Miss Outram took a stroll along the borders of Larne Lough, and were greatly surprised at finding flint flakes, cores, and a finished implement, lying on the shore at their feet. Miss Layard after this made several visits to Larne, and states that she collected nearly 1,200 worked flints. In April, 1909, she also cut a section of the gravels. She says, "through the kindness of Mr. Chaine, the owner of Larne Harbour, who put workmen at my disposal, and allowed me to cut down a section of the gravels on his own property, the flints have been studied *in situ*." Miss Layard invited me to assist her in the investigation of this section. The face having been cleared down to a depth of 14 feet and a large door provided by Mr. Chaine having been laid on the surface at the bottom, on which to throw the dug out gravels, a space of three feet square was measured off. The first layer or surface soil was thrown aside. Then each foot as it was dug out by one of the workmen was thrown on the door, thoroughly examined by Miss Layard and myself, and all the flakes and cores picked out and handed to Miss Outram, who marked the depths and rolled the flints of each layer, with part of the material surrounding them, in a paper by themselves. The board was then cleared by the other workman and a new layer thrown down. I have noted that the matrix of the first layer thrown down was a mixture of clay and sand, and I took notes of the excavation to the end, but I will give Miss Layard's account as it appeared in *Man*.² She gives a diagram and marks the number of worked flints found in the margin—2nd and 3rd feet inclusive, contained 78 flakes, 4 cores, slightly abraded, patination thin bluish white, majority iron stained; 4th and 5th feet inclusive, 33 flakes, 10 cores, 1 large pointed tool, patination creamy white; flints in lower portion much abraded and rolled, no iron stains; 6th to 9th feet inclusive, 18 flakes, 4 cores, 1 large pointed tool (drift type), patination thick, pure white, crust creamy, no iron stains, all rolled and abraded, pointed tool is less rolled and deep cream; 10th foot, 1 flake with good bulb, patination bluish, "perhaps fallen from the surface." A large boulder projected upwards into the lower layers.

¹ *Op. cit.*, p. 180.

² *Man*, 1909, 54.

We see that the various sections we have described differ from each other, also that the condition of the worked flints found at similar depths in the several sections sometimes differed in patination and amount of rolling they had been subject to before being included in the gravels, consequently from the examination of any one section no proper conclusion could be drawn as to the nature and contents of the gravels generally. A sandy layer and upper and lower gravels, as found by the Field Club, was so far from general that another section not far distant was found to be composed of boulders resting at all angles to the horizon, with the interstices filled with fine gravel or sand, and showing almost no difference in structure for a depth of 10 or 12 feet. The irregular layers and unstratified appearance of some sections of the gravels were due to the nature of the formation, that is, beach gravels. The material was pushed along by the waves, coarse and fine together, and in time of storm all would be deposited together in a heap.

DENUATION.

The gravels of the raised beach must at one time have been of much greater extent than they appeared to the geological surveyors in the sixties. Possibly in their early history the raised beach of Island Magee nearly met that of the Curran of Larne, and those of County Antrim and County Down sides of Belfast Lough may have approached near enough to allow only a river of considerable breadth to flow between. But the action of the tides would soon break down the gravels, and begin the widening of the estuary which we now know as Belfast Lough. Denudation continues to the present day, and the oldest inhabitant remembers when the land reached a considerable distance out into the present sea. In March, 1869, Mr. J. H. Staples read a paper before the Belfast Field Club, "On the Flaked, Chipped, and Worked Flints to be found in the gravel in the neighbourhood of Holywood," and in the concluding part of his paper, speaking of the denudation that is taking place, he says, "The sea is now breaking down the bed and strewing the contents on the beach."¹ In the *Irish Naturalist*,² there is an article by Miss Mary K. Andrews which gives an account of the encroachment of the sea and denudation of the raised beach at Cultra, also on the County Down side of Belfast Lough. The article states that "much land has been washed away of which no traces would have remained had it not been for one insignificant landmark. This was a shaft of crown Memel pine some 23 feet high, standing on the beach opposite Cultra Point, a mile north-east of Holywood. It formed part of a windmill pump, which was erected in 1824 or 1825 to remove water from an old quarry. Although now 50 feet distant from present high-water mark the centre of the quarry was 50 feet distant from the sea in 1829." During a walk along the Antrim side of Belfast Lough from Carrickfergus to Kilroot, in the summer of 1910, I came to a man who was working in a field close to the shore, who informed me that he remembered the land

¹ *Annual Reports*, vol. i, p. 72.

² *Irish Naturalist*, vol. ii, p. 16.

reaching out a considerable distance into the present sea, and that what would be equivalent to a good sized farm of land had been washed away by the sea within his own memory. Since I had been last round this way (about two years before) I noticed that part of the raised-beach gravels had been swept away, exposing a bed of submerged peat. These short records of recent denudation will give an idea of what earlier denudation must have been after the gravels were raised above the sea, and will show us why so much of the former contents of the gravels are now found spread out on the present sea shore. Some of the flakes and implements have suffered further from rolling, but many which sank into deeper water, or were wholly or partly buried on the present beach, must have retained the condition as to weathering, rolling, and colouration, which they presented when released by denudation from the gravels of the raised beach.

PATINATION.

Patination is the change produced on the surface of chipped flints by exposure to the weather. In Egypt, flints that have remained for ages exposed to sun and weather are quite dark on the exposed surface, and experts have, in some instances, attempted to make out a scale of ages for these flints according to the degree of darkness of the exposed surface. I have a series of the implements, brought by Mr. Seton Karr from Wady el Sheikh, some of which have been broken across, exposing very good sections of the flint, but as far as I can judge, though the surface is very black, no change has taken place in the substance of the flint along the outer surface.¹ I have some Irish spear heads of flint which had been thrown and lost by their ancient owners, and the parts of the blades which had been covered by the shaft, and thus protected from sun and weather, are much lighter in colour than the portions on each side of the shaft which were not in any way protected. In boulder clay one often finds flints that were broken before being included in the clay, with the outer surface unaltered and quite fresh. In the glacial gravels of Ballyruder, seven miles north of Larne, which are capped by 40 feet of boulder clay, I have found flints in all stages of patination, some reddish, yellowish, and white, like those of the Larne gravels, and others as fresh as if only newly broken. I believe that all these flints, coloured and fresh, were in the same condition when included in these gravels as that in which I found them when I excavated them. While sealed up I believe there was no change. At Whitepark Bay the neolithic inhabitants found flints of the older series, weathered reddish brown and yellow, lying about the shore just as they can be found at the present day. Some of these coloured specimens were brought up to the hut sites in the sand hills and re-worked, and I have excavated from the black layer, which is the old prehistoric surface in the sand hills, some of the flakes with the old highly-coloured patination on the one side, and the quite fresh look of new chipping on the

¹ Probably it required moisture in addition to exposure to the sun and air to produce alteration of the flinty substance.

other; since they were buried, neither side had altered. I should be inclined to conclude from the cases I have mentioned, and which have come within my own experience, that flints buried up will remain unaltered, while those exposed to the weather will be altered in colour, and in some cases in substance. The flints from the raised beach gravels at Larne, and other stations of the older series, are generally of a whitish shade, with an alteration of the substance of the flint to the depth of about an eighth of an inch below the surface. Mr. Du Noyer called this altered substance "kaolin." It has not the character of flint, but breaks with a hackly fracture, and when broken has very much the appearance of the inner substance of delf.¹ The weathered exterior of the flints further resembles delf in having a glazed covering, which has often been broken through, thus exposing the inner white substance before the flints were included in the gravels of the raised beach. In broken flakes or implements from Larne or Island Magee, I have sometimes observed one or two lines of closer texture through the delf-like crust, parallel to the surface of the flake or implement. In my paper on "Flint Implements of the Older Series," in the *Proceedings of the Royal Irish Academy* for January, 1886, I figure two specimens in Figs. 9 and 10. I suggested that the closer lines may indicate a time of rest from the weathering process, when perhaps the objects were buried up in some formation. All the flints excavated out of the raised beach gravels by myself were deeply weathered, mostly white or cream, but some highly coloured yellow, reddish or grey. Mr. Coffey and the Field Club as already mentioned have, however, found some specimens unpatinated, which can be explained by supposing the specimens to have been buried up before being much exposed to the weather. The purity of flint may vary in different places, but in one district, such as Larne and Island Magee, which may be regarded as one, the people who made the older implements and those who made the newer series must have got their flints from the same source, viz., the flints weathered from the chalk, as there was no mining for flint at Larne or Island Magee, as at Cissbury. It is, therefore, very striking to see the older kind so much weathered and altered on the surface, while the newer kind found in the fields around Larne and Island Magee are generally quite fresh and unweathered.

The flint implements from Cissbury, and some from about Beachy Head and Eastbourne, are much whitened and the flint altered near the surface, but not to the same extent as in the implements found at Larne. The implements from Spienne in Belgium are also often much whitened and altered in substance to a certain depth. Sir John Evans describes some flints from Kent's Cavern which were white and porcellanous, and had become so light and soft in structure that they could be cut with a knife. He says, "The cause, as was first pointed out to me by the late M. Meillet, of Poitiers, appears to be inherent in the nature of most

¹ I prefer the more ancient and English name *delf* to the modern form *delft*. In the new Oxford English Dictionary it says, "Since the paragonic *t* was added to the name of the town in modern Dutch it has been extended also to the English word, probably with the notion that *delf* was a corruption.—Vol. iii, Delf-Delft.

flints, the silica in which is of two kinds; the one crystallized silica or quartz with a specific gravity of 2.6, and insoluble in water; the other colloid or glassy silica, known as opal, with a specific gravity of 2.2, which is much more transparent, horny, and soluble, though in other properties both are chemically the same."¹ His explanation is that the soluble portion of the flint has been removed by infiltrating water through the body of the flint. I have never found any Irish flints soft, or in such a state as would enable one to make an impression on them with a steel knife. The outer glazed portion seems to be as hard as the flint itself, and I have also found the inner weathered substance very hard. I have observed that inside the outer covering of nodules of flint derived from the chalk in the North of Ireland, there is an envelope, varying in thickness, of what is apparently purer flint than that of the interior, as when a nodule is broken up into flakes and implements this envelope, wherever it appears, retains its flinty character unaltered, after the other flint which is in close contact with it is weathered and changed in colour. This envelope varies in thickness from a thin line to a ribbon-like band nearly half an inch broad.

STAINING.

The question whether flints could be weathered, some yellow, some reddish, and others black, by exposure to the weather alone, has occupied my mind for some time, but the finding of a core in the estuarine clay, originally white, but now stained a clouded dark shade from having been imbedded in that formation, and also the finding of an implement in reddish clay stained the same colour as the clay in which it was found, lead me to believe that the various shades of colour, reddish, black, etc., which we find on the rude implements from Larne, Island Magee and Kilroot, were imparted to them by formations, in which they had been imbedded for a long time. The estuarine clay is below the level of the sea, and the reddish formation I have referred to was covered by the sea at high water. These formations being therefore always in a moist condition would the more readily impart a stain to the implements. I am therefore of opinion that those old highly-stained implements may have been included for a long time in formations that were beneath the sea, and thus have been preserved from a very ancient time till the present.

GEOLOGY.

Mr. R. Ll. Praeger, in his joint paper with Mr. Coffey, gives the geological side of the question of the raised beach. His paper throws much light on the condition of the Curran at Larne before the gravels of the raised beach were deposited. At the conclusion of his paper he traces briefly the history of the Curran. "In early post-glacial time, we find a ridge of boulder clay occupying roughly the site of the present raised beach, and it was joined by a broad base to

¹ *Ancient Stone Implements.* 2nd Ed., p. 497.

the rising land north of Larne Town, and its crest was at least 50 feet above high water. Depression setting in, the ridge lying in the tide-swept entrance to Larne Lough suffered denudation, and the sea broke through across the neck which joined it to the mainland, leaving the Curran a small island. As submergence continues . . . gravels began to be laid down against and around the Curran islet, especially on the southern side, where they formed a long tail, moulded by the tides. Depression continued to a total amount of some 50 feet or more and until the islet sank below the sea, allowing a few feet of gravel to cover its highest point. By a subsequent emergence to a higher level than the present and then a slight depression, the Curran was left as it was until the advent of railways and factories broke up its surface and exposed for a while a cutting through the several beds of which it was built up."¹

If we consider the question well we must see that the sinking of the land, the formation of the gravels, and subsequent elevation with occasional long intervals of rest, occupied a very long time. That there must have been long periods of rest, with the gravels entirely or in great part beneath the sea, we may surmise from the caves that have been formed in the cliffs of the north and north-east coast of Antrim by the action of the waves. During all this time that the land was first sinking and then rising, we may ask—where were the people who made the flint flakes and implements which are found in the gravels? Did the manufacture of flakes and implements continue during the sinking and elevation of the land, or was there an unfavourable change in the climate which obliged the people to leave the place where they had lived and laboured, and thus stop the manufacture? I believe this latter query must be answered in the affirmative, as all flint working appears to have stopped, and the products of the people's industry would seem to have been lying around the shore, and whitened with long exposure to the weather, before the sinking of the land began. During the sinking they were dashed about by the waves and knocked against other stones till all sharp and thin-edged flints were much chipped. Thinner flakes and smaller objects may have been carried away by currents, or conveyed by the waves to the outskirts of the raised beach. Any unpatinated flakes that have been found can be accounted for by their having been covered up before being exposed to the weather.

When flint workers next appear it is among sand hills that accumulated on the surface of the old raised beach, as at Whitepark Bay on the north coast of Antrim, Portstewart, near the mouth of the Bann, and elsewhere. As I have already stated, these newer workers in flint found the cores and flakes from the raised beach deeply weathered and browned, lying on the sea shore, and took them up to their hut sites and tried to re-work them. There seems to have been a complete break between the older and newer series of flint implements in the North of Ireland, and that break appears to have been of a similar kind to that between palaeolithic and neolithic implements.

¹ *Proc. R.I.A.*, Vol. xxv, sec. C, p. 144.

WAS LARNE A DWELLING SITE?

Mr. Coffey has raised this question in his joint paper with Mr. Praeger. He says, "the Larne gravels were not a dwelling site. The general evidence leads to the conclusion that they were a quarry shop or roughing out place where the flint was sought and flaked to carry away." In the *Fifteenth Annual Report of the Bureau of Ethnology*, Washington, Mr. W. H. Holmes describes factories of the kind suggested by Mr. Coffey. On the sides of a river near Washington the gravels were composed of boulders of quartzite, quartz, jasper, and flint, all suitable material for making into stone implements. The people came to this place and quarried the materials, smashing the bigger stones and giving the pieces a rough dressing; they then carried away the pieces to manufacture into various kinds of implements elsewhere. These sites Mr. Holmes calls quarry workshops, and he thinks this method of roughing out the material, and carrying the chipped product elsewhere for further manufacture, may have been pretty general in Stone Age times. I do not, however, see that this division of labour in the manufacture of flint implements was common in Ireland. Larne and other sites of the same kind having been sunk beneath the sea, all trace of dwelling sites, if such existed, have been destroyed, but in such sites as we find in a fair state of preservation, we see that making flakes and implements was all done at the same spot. If we found flint implements abundant in the southern parts of Ireland, where chalk with flints is not found, we might say that flint had been broken up along the outcrop of the chalk in Antrim, and carried southwards, but we find flint implements exceedingly scarce outside the district where the chalk with flints occurs, showing, I think, that very little intercourse between north and south took place in these early times. I believe the only way in which flints from County Antrim found their way to other parts of Ireland was by drifting along the seashore. At Dundrum sandhills in County Down we find the flint implements around the hut sites there all of small size, and they show that they have been made out of small cores or lumps with deeply weathered crusts, like the flints found at Larne and Island Magee, as parts of the weathered crust enters into the composition of most of the newer implements. Near the mouth of the Boyne we find the flints that have reached that place smaller than those found at Dundrum in County Down, and at Malahide, nearer Dublin, the nodules have become smaller still, yet these very small pieces have been utilized and chipped into minute flakes. Small pieces of flint have likewise been carried round the north coast of Ireland, as we find that they have been manufactured into small implements by the people who dwelt in the sandhills along the northern coast of Derry and Donegal. At Horn Head, Ballyness, Narin, Maghery and Bundoran these small pieces of flint, not in the form of roughed out pieces carried from Larne to be further specialized, but little sea-rolled nodules, have been collected by the people and flaked for making into knives and arrow heads. Currents of the sea, or perhaps glaciers, appear to have been the only distributors of flint in

Ireland, and that only to about as far as Malahide on the east coast, and Bundoran on the Atlantic coast of County Donegal on the west.¹ There was nothing to prevent the flint workers of Larne from living there. On my various visits I have observed the crops to be earlier sown and reaped there than in the centre of Antrim, showing that it was warmer than inland parts. Then there were cliffs for shelter and, what appears to have been attractive to prehistoric peoples, the neighbourhood of the sea. I believe the people who made the older implements, whether at Larne and neighbouring sites, shores of Belfast Lough, Carnlough, or Whitepark Bay, must have dwelt there. I shall now describe the products of the industry, and archaeologists will then be better able to judge whether they are real tools and implements such as were suitable to the needs of the people, or were only roughed-out pieces intended to be carried elsewhere to be worked into better implements.

PRODUCTS OF THE MANUFACTORY.

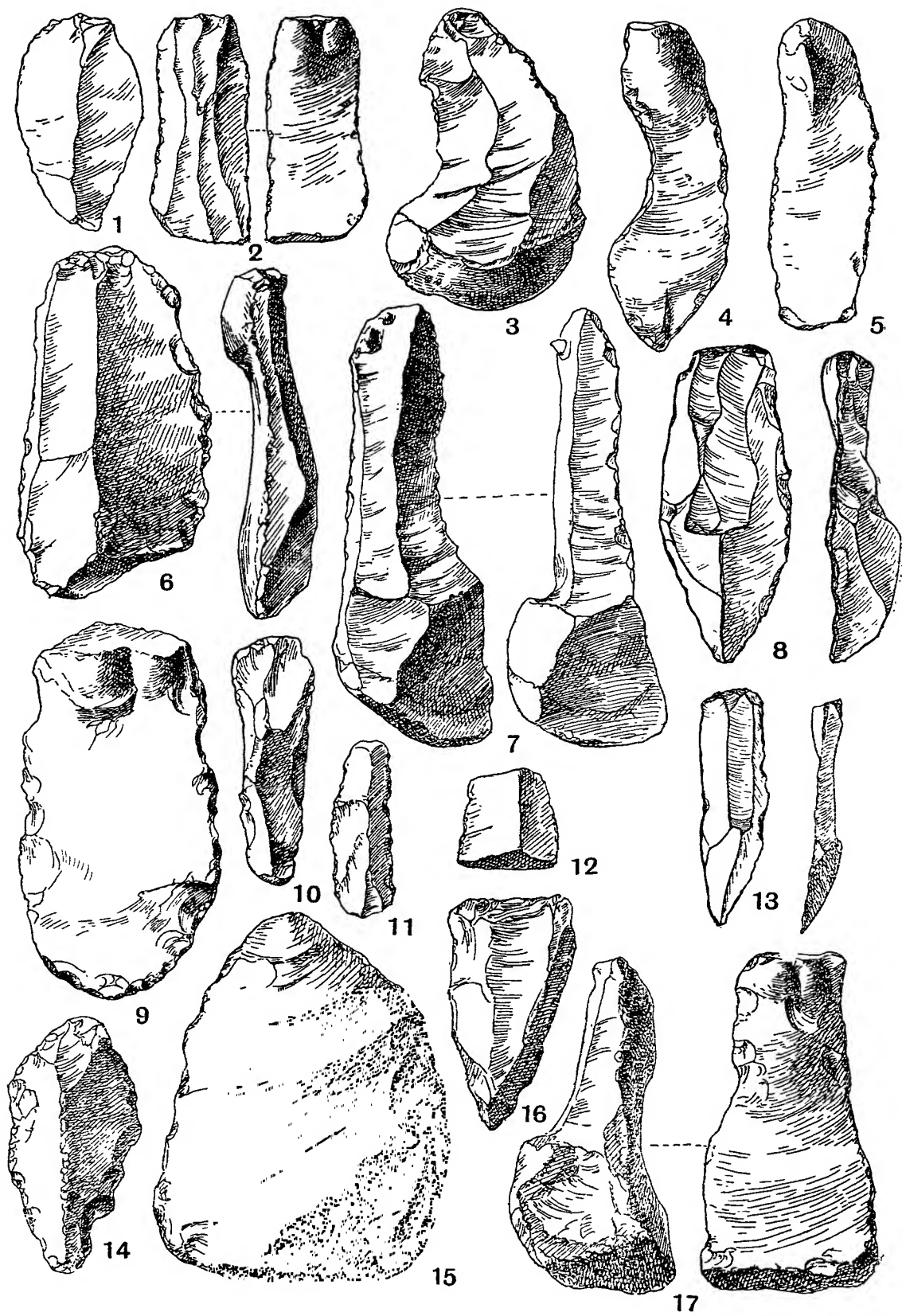
The products of the Larne industry, and that of similar sites, were, as far as I can make out, flakes, cores, knives, spear points, scrapers, axes, choppers, strong pointed tools, and large hand weapons. I shall describe the various objects separately, but it will be readily understood that owing to the long time the flakes and implements were beneath the sea, and the injuries they received by being rolled about by the waves on a rocky beach and dashed against stones, the purpose for which an implement was intended is often greatly obscured. I have lately refreshed my mind by examining again all my collection of the older series of flint implements, and I shall endeavour to throw as much light on a difficult subject as possible.

FLAKES.

Flakes may be divided into two kinds: (1) those which have been struck from cores for the sake of the flakes themselves, and (2) those struck off during the manufacture of an implement. The first are usually long with two sharp edges, and could be used without further dressing as knives, or, if heavy flakes, as choppers, or, if pointed, as spear points, but pointed flakes are rare at Larne and similar stations. The flakes of the first kind are, as a rule, narrow at the bulb end, and broad and heavy at the end opposite. I have seen large flakes of this kind made into hand weapons with a blunt point at the bulb end. Flakes of the second kind are waste products, as they are mostly produced while manufacturing an implement; as the latter is the object sought after, the flakes are the waste pieces, which one might expect would be of no further use. But in all times of flint implement making such flakes were not allowed to go as waste. They are generally short and broad with sometimes a wing running into a point proceeding from one side; such

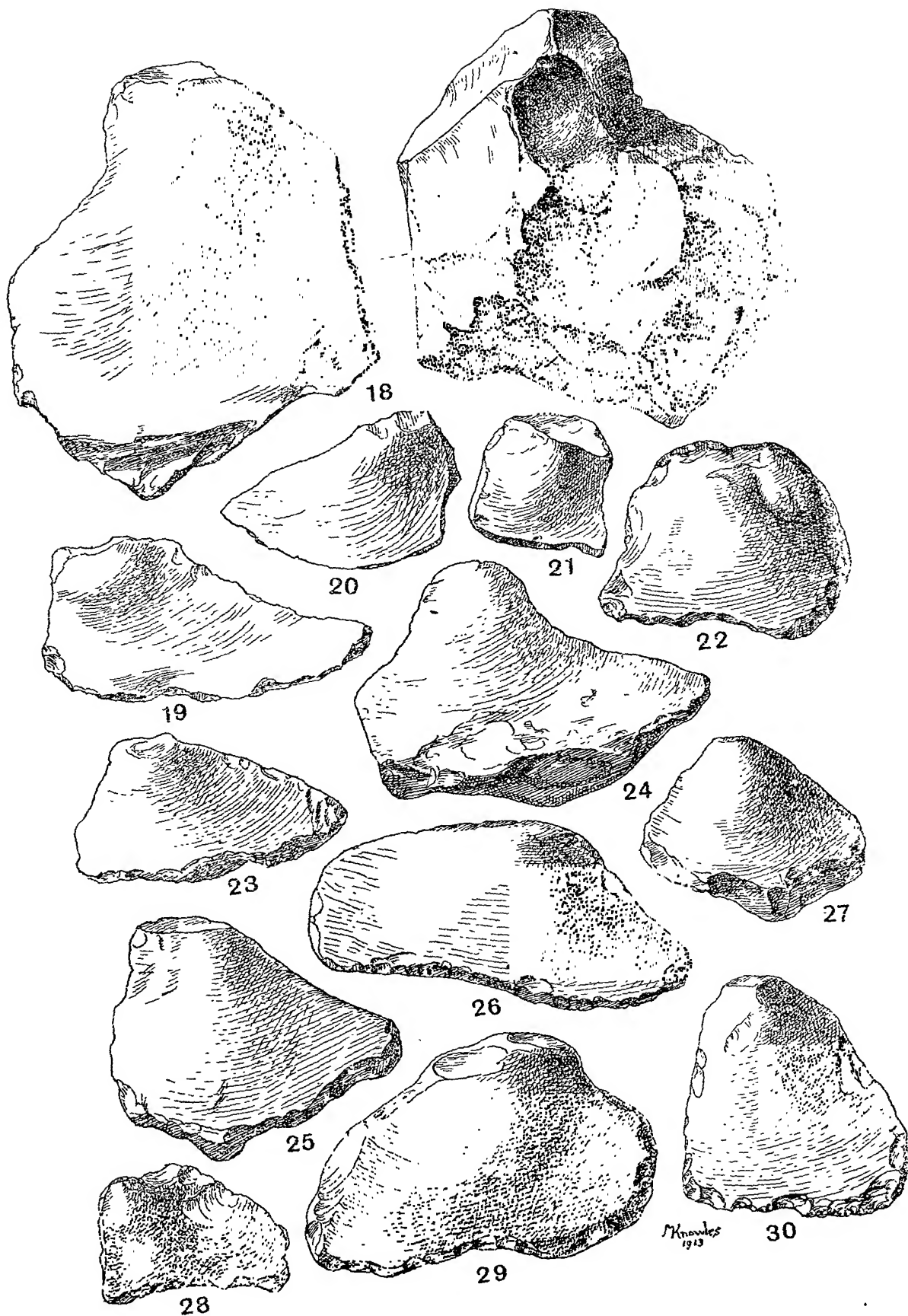
¹ Stray pieces of flint may have been carried farther. My daughter, M. C. Knowles, found two small scrapers of flint in kitchen-middens in County Clare.

flakes in palaeolithic times, especially in France, were made into "racloirs" or broad scrapers, and the pointed implements dressed along the sides which are known as Mousterian points. Such implements survived in Ireland into Neolithic times, and we usually find them where axes or large implements were manufactured, as at the axe factory near Cushendall, where they occur in considerable numbers. Some of the Larne flakes are very large. I have excavated them from various depths in the sections of the raised beach at Larne Harbour, weighing from one to three pounds. Large flakes were most abundant in the railway sections which were opened where the gravels were deepest, and being heavy would therefore not be carried far by the waves; the lighter flakes on the other hand would be carried by the waves to the outskirts of the original raised beach. The flakes I shall now describe were either excavated from the sections made by the railway, or were collected out of the denuded material of the beach spread out on the shores of Larne and Island Magee. I show in Fig. 1 a flake found at a depth of 18 feet at the base of one of the sections made by the railway company. It is thin and pointed and has been weathered till its entire surface is white, and a layer of the flint close to the surface altered in character, but its edges are entire and free from any trace of that natural chipping which is common on other flakes found in the gravels of the raised beach. This specimen must have been exposed to the air till it became weathered on one side, and turned by the waves and exposed till it became equally weathered on the other side. It must have lain in a sandy bottom till it was eventually covered up. This flake and a companion specimen shown in Fig. 2 were found in a hole which was sunk in the lower ground after gravels about $14\frac{1}{2}$ feet in depth had been removed. The hole or pit was 4 feet in depth, and by digging along the sides near the bottom I obtained these two flakes and some other artificially worked flints, all taken from solid gravel which had not previously been disturbed. Fig. 2 is weathered white on both sides, but its edges are broken, probably from being rolled by the waves in a gravelly bed, though such chipping as appears on this flake might have been caused by its being used as a knife. The point of this flake has been broken off in ancient times, as the fracture is an old one and is whitened like the two faces. I give two views to show that it has two bulbs of percussion. Fig. 3 is a characteristic flake which I excavated 9 feet from the surface in one of the railway sections. It is rudely pointed at the upper or bulb end, with a heavy base at the end opposite. One side is concave, and the other is convex, but the concave side has been rather more chipped by being tossed about than the other, owing to its being thinner than the convex side. The patination is whitish like Figs. 1 and 2. I show in Fig. 4 a flake which has also a concave and convex side, yet though neither side seems to be thinner or weaker than the other, the concavity of the side to the left of the figure shows a considerable amount of chipping which is regular and all to one side. Having found a similar specimen I am of opinion that Fig. 4 may have been used as a hollow scraper. It was found on the beach of Island Magee and has a creamy white patination. It has received no injury from lying on the beach, as no recent

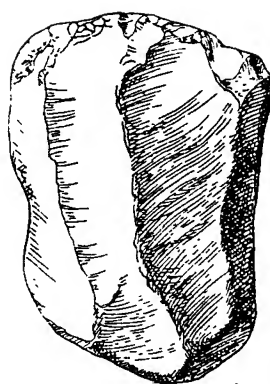


flakes are visible. I show Fig. 5 on account of its peculiar bulb, which has not a rounded shape like most bulbs, but shows in the centre, where the bulb should be, a sharp knife-like ridge. I have a small series of flakes with similar peculiarities. It is well chipped on the back by the removal of previous flakes, and is chipped on the edges, the chips being all old and, like the rest of the surface, weathered white. It was found on the beach of Island Magee. Fig. 6 was found in a section behind some stores which has therefore been called by me the Store section. It was found 5 feet from the surface, is whitish in patination and its edges are much chipped but of old date, as the patination of the chips is similar to that of the surface of the flake. The bulb in this specimen is also peculiar, as instead of sloping down gradually and merging into the face of the flake, it descends by rather a sharp step as is seen in the side view. I show a larger and longer flake in Fig. 7. The lower end in the figure is heavy owing to previous flakes breaking off before reaching the opposite end of the core to that which was struck with the hammerstone. I give two views to show that several flakes had broken short. If the core had been lost before the flakes were struck off, some archaeologists might have said that it was an imperfect core and did not flake true, but we see that it only required a stronger blow to strike off Fig. 7, leaving this, however, with a large lump at the base.

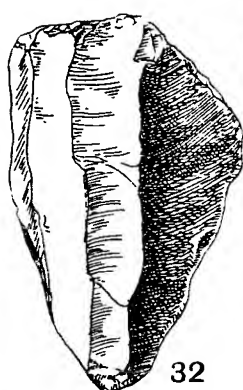
This is not a very great disadvantage as the lump acts as a handle and the edges towards the bulb are good and sharp. The flake would make an excellent knife. This specimen had sunk to the bottom of the shallow sloping sea between Larne and Island Magee, but a sea weed grew on it and brought it to the shore. It has a bluish white patination. Fig. 9 is another example of a flake with two bulbs of percussion. It was found on the shore of Island Magee, and has whitish patination. Fig. 17 is another specimen having two bulbs. It was found on the shore at Larne and has also whitish patination. It shows that several flakes had broken short before a stronger blow struck off this heavy flake, which may only have been regarded as a waster, though one can see how it may have been used as a rough scraper or chopper. Fig. 15 is a very heavy flake found at the bottom of one of the sections at Larne Harbour. One heavy blow has produced a cone reaching round to the back of the flake and producing a blunt point. It has a heavy butt suitable for fitting the hand, and has apparently been dressed intentionally as a hand weapon. It has been chipped over the back, and only one small piece of the crust of the original nodule is left. It helps to illustrate the theory I have always held that the blow of the hammerstone produces a series of waves in the core. These give direction to the splitting off of the flake and are the cause of the bulb. In this case there are indications of four or five waves which have caused a kind of ripple on the surface. The patination is whitish. The double bulbs of some flakes were no doubt caused by a hammerstone with two small projections, or harder parts, which in the same blow produced two points of impact instead of one. It is a general remark that pointed flakes are rare at Larne, but being as a rule thinner and lighter than the heavy-butted



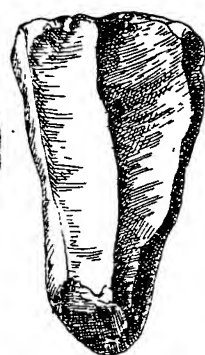
flakes, they would be carried farthest from the original centre of production by the waves. I show examples of pointed flakes in Figs. 8, 13, 14 and 16. The specimens shown in 8 and 13 were found at the sections near Larne Harbour, but not *in situ*. I give side views of these two flakes, and it will be observed how they both show a considerable hump near their pointed ends. The patination is whitish. Fig. 16 is also thickest from face to face near the point, and if it is viewed sideways the point has a beaked appearance. It was found at Island Magee and has a brownish-yellow patination. The flake shown in Fig. 14 has been pointed, but is a good deal chipped along the edges, and shows, I believe, a mixture of artificial and natural chipping. There are shown in Figs. 10 and 11 two of the smallest flakes found. They are rather equal in thickness from end to end of each flake. Fig. 10 was found in the section near the aluminium works, resting on boulder clay. It has a glazed and whitish patination. Fig. 11 was found at the sections opened up by the railway but not *in situ*. Its edges have been greatly chipped, but the chipping is all old, and patinated, like the faces of the flake, a reddish-yellow shade of colour. It is seldom that any broken flakes are found in the sections, but Fig. 12 shows a portion of a flake that was broken early in its history, as the two breaks, one above and the other below in the figure, are both old, and, like the two faces, show a creamy-white patination. It was found *in situ* 3 feet down in a section of the raised beach on Island Magee. Those flakes in Figs. 1 to 17, which I have described, are all of the first kind referred to, that is, struck off cores for the sake of the flakes themselves. They are the most numerous. The second kind are as a rule broad and short, and were struck off while manufacturing a large implement. Examples of the second kind are shown on Figs. 18 to 30. They are generally broader than long. Fig. 18 is a large flake weighing 2 lb. 10 oz. It has been greatly chipped on the back, and shows zig-zag chipping along the line separating the light and dark shading in the second figure, such as is often seen on the edge of a chipped implement. It was found 5 feet down in the store section. It is patinated a creamy white, and its edges are not greatly chipped. I show back and front views. The projecting point of Fig. 20 will be observed; its edges on the back or underside are dressed into a "racloir" or "pointe." Fig. 19 shows a flake found on the shore at Larne, having a long point projecting from the right side. The edges are a good deal chipped, but I believe none of the chipping is artificial. Fig. 21 is a short squarish flake from the blue estuarine clay at Larne Harbour. The patination is yellowish on one face, that shown, and reddish on the back or underside. Fig. 23 shows a flake which was found 7 feet down in the railway section. It is well chipped along the back or underside of the figure into a Mousterian point. Fig. 22 has dressing along the edges very similar to that on some of the plateau implements of Kent, that is, of a fine kind across the flake at right angles to the two flat faces. Figs. 24, 26 and 27 were found on the shore of Island Magee, and show no sign of having been dressed for, or employed in, any useful purpose. They are merely the waste products of implement-making, but characteristic of that business. Fig. 25 from Island Magee has all the characters of a



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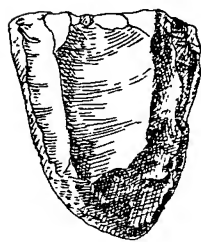
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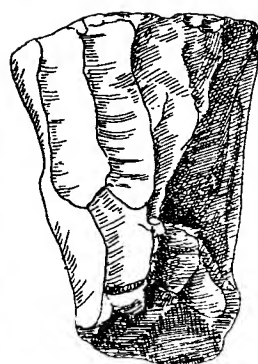
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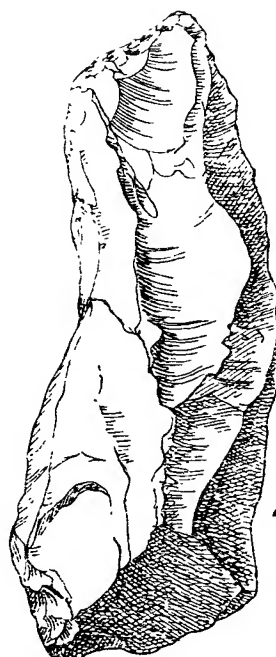
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"racloir," showing some chipping which it is easy to distinguish as artificial, patination deep yellow; Fig. 28 is another small specimen of the plateau kind of implement with yellowish patination. It also comes from the beach of Island Magee. Fig. 29 is also like the plateau implements in character. Its broad edge in the lowermost part of the figure is greatly blunted, but from the way in which the upper or bulb portion has been boldly chipped, evidently intentionally to fit the hand, I believe it has originally been a chopper. It was found on the shore of Island Magee and shows signs of much rolling. It is weathered a greyish brown shade. The example shown as Fig. 30 is also from Island Magee. When viewed on the back or underside, there is seen a sloping facet which meets the front face, making an edge at the lower part which gives the flake the character of a short kitchen-midden axe. The edge has been greatly chipped, I believe by use as a chopper. The patination is creamy.

CORES.

Cores are plentiful in the gravels of the raised beach at Larne, as well as among the flints spread out on the beach at Larne and Island Magee. Being pretty solid lumps, and not flat and thin like most flakes, they have not been carried by the waves to a great distance, but have remained near their source of production. I show in Fig. 31 a core excavated 5 feet from the surface in one of the railway sections. It is deeply weathered, and the angular ridges between the places where flakes were detached were worn down by rolling, previous to inclusion in the gravels. The patination is whitish. Fig. 32 was found 14 feet down in same section *in situ*. It shows that fine and thin flakes were struck off it. The patination is a creamy white. In Fig. 33 I show a core from the estuarine clay, which is a blackish clay found below the raised beach gravels. The specimen is instructive, as its patination, which has originally been whitish like that of the flints from the raised beach, is now clouded a dark smoky colour, which cannot be washed off. It is instructive as it shows that flints can be stained while enclosed in certain formations. The estuarine clay is a formation lying beneath the level of the sea, and being of a blackish colour, it can, as we see in this specimen, impart some of its colouring matter to objects imbedded in it, while in the well washed raised-beach gravels high above the level of the sea the weathered flints come out as pure a white as when they were enclosed in them. There is seen in Fig. 34 a very perfect core, showing that many small and thin knife-like flakes have been detached from it. It was found on the shore of Island Magee, and is patinated a reddish-yellow colour. Fig. 35 is a large core, but there must have been many cores much larger than this example, as we see by the flake shown, back and side view, in Fig. 40. This is a kind of flake very characteristic of the Larne gravels, but by no means the largest in size. In Fig. 36 we see another very good example of a core from which many small knife-like flakes have been detached. It was found 12 feet down in one of the sections near the railway, and is patinated a dull

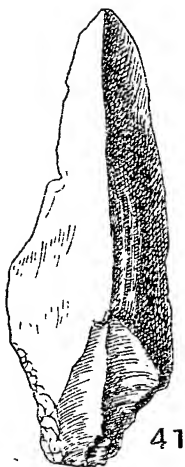
whitish colour. Fig. 37 was found at the depth of 12 feet in the same section which contained Fig. 36. The patination is greyish. Fig. 38 is a very small core which shows, more than actual flakes which have been found, the small size of flakes that were required and had been produced for the use of these ancient Larne people. This small core was found on the shore of Island Magee and is deeply weathered a reddish-yellow colour.

HAMMERSTONES.

In the early days of exploration of the Larne gravels the absence of hammerstones was remarked. Sometimes objects were found that were suspected to be hammers but were afterwards rejected as unsatisfactory. It was supposed that rolling on the beach by the waves, and also weathering, had obliterated all the characteristic marks of hammering. Lately, however, I have found a few specimens which are undoubtedly the ancient hammerstones. They are made of flint but not apparently waste pieces. A piece of flint to all appearance as good as any used in the manufacture of an implement has been carefully chipped into a rounded shape; then the more projecting parts have been used in turn to strike the core until it became a rounded ball. Fig. 39 shows an example. It was found in Island Magee and is patinated a greyish colour. I have another specimen similar in size, found at Kilroot. The chips or flakes of manufacture are plainly visible, and the marks of hammering are distinct and fresh. I obtained it from a soft reddish clay derived from the new red sandstone, to be seen in cliffs around the shore. Where the flakes of the original chipping are distinct, they are patinated the same kind of reddish-yellow colour as many implements found at the same place. These two specimens weigh 2 lb. 3 oz. and 2 lb. 2 oz. respectively. I have a smaller specimen weighing nearly 1 lb., and a larger specimen weighing $5\frac{1}{2}$ lb. Besides these I have several rounded pieces of flint, which, judging from the appearance of the specimens described, I believe to have been hammerstones; but they have all the marks of hammering worn off by much rolling on the beach. No doubt quartzite pebbles may have been used as hammers, as in later sites, but as yet I have not been able to find an undoubted specimen.

KNIVES AND SPEAR HEADS.

Although many flakes could be used as knives without further dressing, yet a few examples have been found which show a certain amount of artificial work to prepare the flake for a knife or a spear head. The flake shown as Fig. 41 is pointed, with two sharp edges. It has a tang neatly dressed at the bulb end so as to fit it for going into a shaft or handle, and in this respect it resembles many of the pointed flakes that are found along the shores of Lough Neagh and the River Bann. This specimen was found in April, 1897, near the shore as you go from Baystreet Larne to Waterloo. I observed some potatoes, newly planted, in a small field close to the shore, and numerous flints appearing in the upturned soil. I



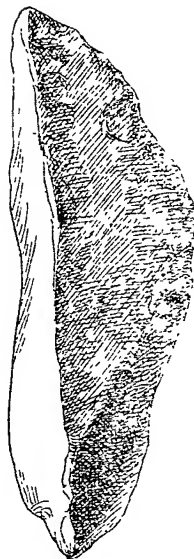
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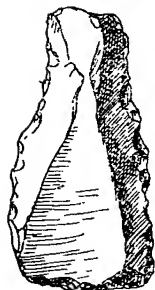
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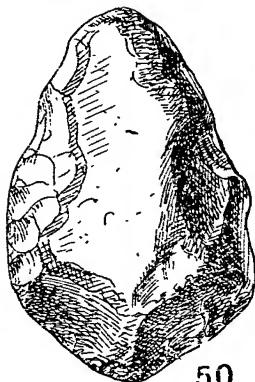
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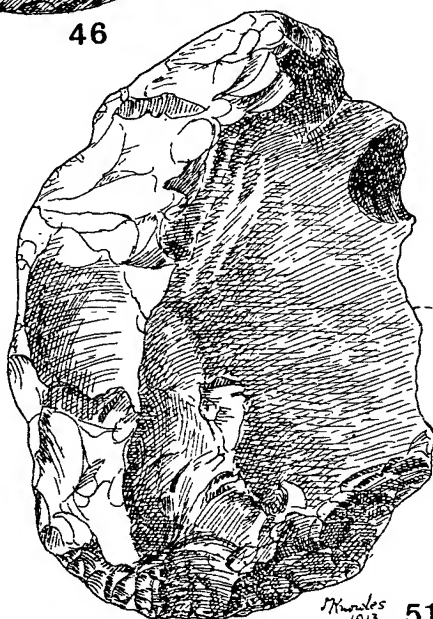
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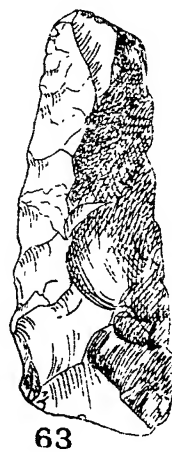
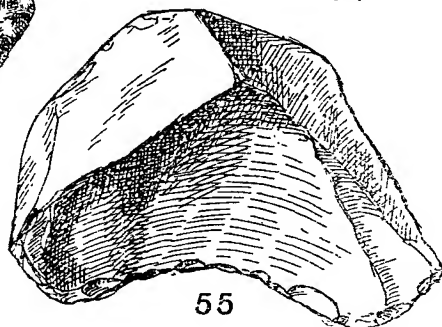
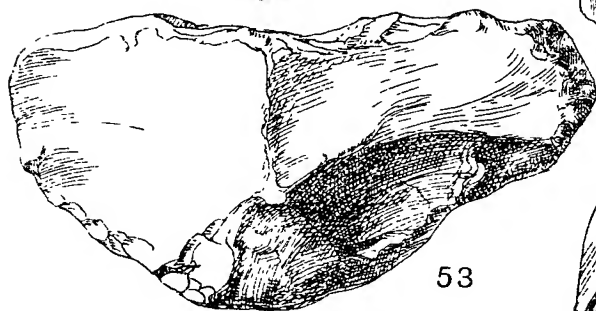
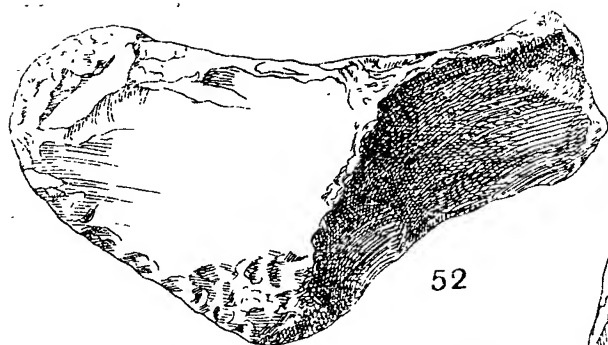
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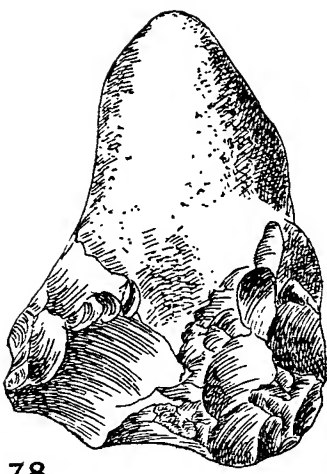
found on the shore of Island Magee. Its patination is brownish-yellow. I show in Fig. 57 a very perfect axe of this kind, found also in Island Magee. The patination is greyish and glazed. Fig. 58 is from the raised beach at Portstewart, County Derry, and has a creamy-white patination. In Fig. 59 is represented a specimen from the sections at Larne Harbour, but not found *in situ*. The edge facet as seen in the figure has a black patination, and was probably a portion of some much older implement. This facet forms an edge with a flat undersurface. The other parts have the usual whitish patination of flints from the raised-beach gravels. Fig. 60 shows one of the Rev. W. A. Adams' axes. It was found in a field close to Larne town and is slightly iron-stained. The patination is otherwise whitish. Fig. 61 shows Mr. Adams' second specimen. It has a sloping facet forming an edge with a flat undersurface. It was found in Island Magee. I show the Rev. J. Smith's specimen in Fig. 62. It is formed by a few bold flakes and is rather a larger specimen than those previously described. It was found in a field in Island Magee, I understand, not far from the sea. The patination is whitish, and it has no iron stains. I show in Fig. 63 an implement of this kind which shows good workmanship in the body of the axe. The edge is somewhat blunted, but the facets which formed the edge are distinct. It was found on Island Magee, and has a yellow patination. I have several more axes of this kind, mostly from Island Magee, but the edges of all are more damaged than those I have figured. I do not believe that the edges of axes of this kind were formed by striking off a facet from one side of the edge and then another from the other side after the axe was otherwise formed. On the contrary, I believe the edge was the first part formed. It was really there from the first and the axe was made to suit the edge. Many axes of this kind are made out of large and thick flakes, one of the edges of the flake forming the edge of the axe. The bulb of percussion is often seen distinctly on one side of a kitchen-midden axe, and in others heavy chipping to level down the bulb is observable. Another proof that the two facets of the edge of a kitchen-midden axe were not the last formed, is found in the fact that the side chipping of the axe always cuts into the edge facets, whereas the latter never cuts into the side chipping.

POINTED IMPLEMENTS.

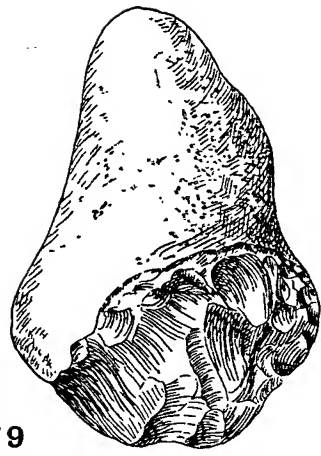
The implements I am about to describe are sometimes called by local authors "Larne Celts," but they have not a broad cutting edge like celts. On the contrary, one or both ends are pointed. I show a small, longish oval implement in Fig. 64, which is pointed at both ends. It was found on the shore of Island Magee, and has creamy patination. Fig. 65 is pointed at one end only. It is dressed all over, but the underface is flattish and the upperface, shown in the figure, is convex, but not regularly, since it has a long slope on the left side and a steeper slope on the right. The patination is whitish and it has been much rolled, the glazed surface at all angular parts being worn off. It was found on Island Magee. The point of this implement is well shaped, and it could serve as a point for a heavy spear, or be used as a small hand weapon. Fig. 66 is oval in section and shows bold but regular

HAND WEAPONS.

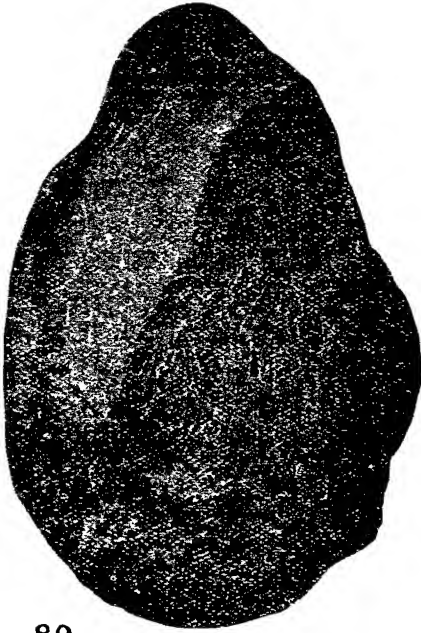
While some of the objects already described may have been hand weapons, those next to be described are peculiarly fitted for use in this way, and must have been used chiefly in the hand as weapons of offence or defence. I have exhibited and described them on several occasions: before the Royal Irish Academy in 1883 and again in 1885; at the Southport meeting of the British Association in 1883 and again at the Liverpool meeting in 1896; also at a meeting of the Anthropological Institute, London, in 1884. My two short papers read before the Royal Irish Academy were published, but are now, I believe, out of print. Only short abstracts of my other papers appear in the reports of the British Association for the years mentioned. At the Southport meeting Mr. Pengelly was president of the Anthropological section, and after the reading of my paper he took up a large pear-shaped implement, which I exhibited, having striae very plainly marked, and said he could embrace the man who had exhibited the specimen showing glacial striae on the chipped surface. At Liverpool I wished to have the opinion of the eminent archaeologists who usually attended meetings of the British Association, on the Larne implements, and I exhibited them during the meeting in a room set aside for exhibits. The time for reading my paper came on just before luncheon time, and the President informed me I had only 10 minutes to state my views. I was about half through my paper when the meeting closed. There was, of course, no discussion, but Sir John Evans came to me and said he was sorry he "could not accept them"—meaning, as I understood him, that he could not accept the implements I exhibited as products of man's workmanship. Mr. George Coffey, in his joint paper with Mr. Praeger, while treating of the flakes, cores, and smaller flint implements found in the raised beach, refers to the large implements as follows:—"The large pear-shaped pieces of flint collected by Mr. Knowles along the shores of Larne, Island Magee and Kilroot, and regarded by him as artificial, are not discussed in the present paper. None of them has been found in the gravels but only along the shore line." I mention these pieces of adverse criticism, as it is only fair to show the opinion of eminent archaeologists regarding the flints. I may say, however, that I have found them in the gravels of the raised beach at various levels, and one, especially, at the very base of the gravels, was taken out by my daughter, Matilda C. Knowles, and myself where it was very firmly bedded, and found when extracted to be greatly weathered, and the surface stained a reddish-yellow colour; it was also striated. I still believe what I said about these objects in 1883 and 1884—that I consider them to be implements specially manufactured by man. To describe them generally, they are implements with heavy butts which fit the hand well, and with blunt points. My own explanation of their use is that they would be powerful weapons for protection by enabling the owner to strike a stunning blow, or repeated blows in quick succession, on an animal attacking him; or if wishing to secure an animal for food, he could accomplish his object best by first stunning it, as is still the practice by butchers at the present day, when the bleeding and skinning could be effected by



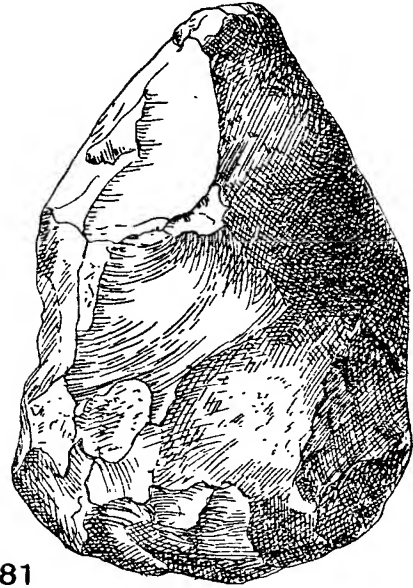
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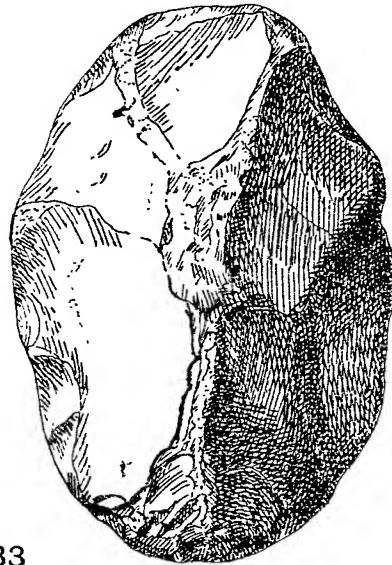


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fit the hand, with the face shown convex, and the side not shown partly flat and partly concave. From this latter face several flakes have been struck, forming a point which, when viewed sideways, has a beaked appearance. Patination mixed, but chiefly yellowish. It was found on the shore at Kilroot. Fig. 85 shows an implement formed from a somewhat cylindrical-shaped nodule of flint. A butt has been formed and several projecting spurs removed; then by hewing down one side in a sloping fashion till the opposite side or face was reached, a good striking point was formed. The lower part of the implement is somewhat circular in section. It was found on the shore at Kilroot, and the patination is varied, being in parts black and in others grey and yellow. I have other implements similarly manufactured. I have one implement from Kilroot, which is formed from a flattened nodule of flint. It was fashioned into an implement by hewing it down on three sides perpendicular to the two faces. This implement is in shape exactly like Fig. 86, which is partly manufactured in a similar manner. The side to the right of the figure has been hewn down by bold chipping perpendicular to the two flattened faces. The other or left side of the figure is chipped from the edge across one of the faces, and the base has been formed by one long flake running from the left corner of the figure almost entirely across the implement. I have another implement, exactly similar, from the raised beach near Portstewart, fifty miles distant. The patination of Fig. 86 is bluish-grey; it was found at Kilroot. We see in Fig. 87 an implement from Island Magee which has one side heavy (the left of the figure), though not hewn down as in the last example, and the right side has been chipped from the edge over both faces. It presents a blunt edge to the right. On this side it is not unlike a palaeolithic coup de poing. The patination varies in different parts, being greyish-brown and yellow. The specimen shown in Fig. 88 was found on the shore three miles north of Larne. The upper end in the figure is chipped over both faces, and ends in a rude point; one side is somewhat thicker than the other, as in the last specimen, the thinner side forming a rude edge which could not have been of much use in cutting. The chipped portion of the implement has a whitish patination. The natural butt fits the hand well, and it makes an excellent hand weapon. It has the look of a coarsely-chipped coup de poing. I show in Fig. 89 an implement with a heavy butt smoothed by chipping to fit the hand, though that part is mostly formed by the crust of the original nodule. The pointed part is triangular. A portion has been hewn off to form one side of the triangle. From the chipped face already formed a further portion of the nodule was struck off, thus forming another side. The portion of the original nodule remaining forms the third side of the triangular point of this implement, but the original crust near the point is neatly chipped off. It has a yellowish patination, and it was found on the shore of Island Magee. One has only to feel it in the hand to find how excellent an implement it would be; indeed one has only to grasp any of the large hand weapons I have described (and I might include numerous specimens I have not yet described) to see what excellent weapons they are for either offence or defence.

ANIMAL REMAINS.

There was found in the Larne gravels in the section sometimes described as the "Store Section," by the late Dr. Moran, Inspector of Schools, a mammoth's tooth. It was exhibited and described in a paper read by Dr. Moran to the Natural History and Philosophical Society, Belfast, which appears in their *Journal* for 1888-9, p. 35. This tooth is now in the possession of the Royal Irish Academy.

The late Canon Grainger had a bone of a whale, which I heard him describe as belonging to a species not now found in the northern hemisphere. He said it was found in the Larne gravels, but I do not know what expert opinion he had on the bone.

I have myself a bone found 18 feet down in one of the sections of the raised beach gravels near Larne Harbour. I sent it for identification to Professor Newton, of Cambridge, and he sent it back labelled "Qu. upper outside portion of the left ulna of *elephas*."

The shells found in the raised-beach gravels are all, I believe, of living species.

BALLYRUDDER.

I have referred to Ballyrudder gravels and it is perhaps necessary I should say something about them. They are a formation of glacial age situated on the coast road about seven miles north of Larne. The gravels are about 20 feet thick and are capped by boulder clay 40 feet thick. They contain shells of Arctic character. I expect it was at the time the coast road was being made, that a portion of both clay and gravels at one end of the formation was removed, thus showing a very good section. There was a portion of the gravels remaining at the bottom without the covering of boulder clay. There was even a portion of the uppermost gravels removed, about 10 or 12 feet in thickness, I believe. I frequently visited this section and walked on the platform of gravel to examine the 10 or 12 feet of gravels between where I stood and the junction with the boulder clay. With the aid of a small hand pick I extracted numerous pieces of flint. Among these are several flakes with good bulbs of percussion, and some core-like objects. Some show various shades of staining, while others are as fresh looking as they must have been when first enclosed. On February 16th, 1892, I read a paper on the finds I had made in the gravels, before the Belfast Field Club. As a result of the discussion on the paper a resolution was passed by the meeting recommending the Committee to undertake the investigation of these beds with a view of settling the point which I had raised. A committee of four members besides myself was appointed, and they lost no time in carrying out the investigation. The result was not very satisfactory from an archaeological point of view, as only one broken flake, the bulb end, was found during the investigation. Perhaps my own investigation, being made nearer the top of the gravels than that of the Field Club, was more successful,

showing, if we judge by the Larne gravels, that flakes occur most abundantly near the top. I should like to see a good broad section of these gravels made from where they join the boulder clay on the top, to the bottom. The glacial gravels are on one side of the county road and the raised-beach gravels, much reduced in height from what we found at Larne Harbour, appear on the other side of the road, jutting out in places towards the sea. Some years ago a mammoth's tooth was found by, I believe, a labourer employed as a surface man on the road. It was for a time in possession of Mr. Dale, a farmer, and eventually was obtained by the late Canon Grainger, and is still in his collection in Belfast. He, after making a full investigation, stated that it was found in a small portion of the raised beach opposite Ballyruder, and Mr. W. A. Traill found scales of the tooth on the portion of beach where it was alleged to be found. These statements were questioned, but I think there can be no doubt that it must have come either from the raised beach on the one side of the road or the glacial gravels on the other.

THE PALAEOLITHIC COUP DE POING.

The implements nearest in shape to the large hand weapons from Larne, Island Magee and Kilroot are those called by French archaeologists "*Coups de poing*,"¹ but these latter are more skilfully worked than the Irish implements. I have often thought over the question of where the *coup de poing* was developed. It is admitted that it was not man's first effort at flint implement making, but as antiquaries have not as yet been able to find satisfactory evidence of a type of implement that might be looked on as its precursor, it is a fair question for inquiry where the *coup de poing* itself had its origin. In considering the question I think we are limited to a very few sites that could compete for the honour of first place. There are Southern England and North-western France which we may look on as one. There is the province of Madras, in India, where many large implements have been obtained from time to time. The only other places where implements of the *coup de poing* kind have been found in considerable quantities are Egypt, Somaliland, and South Africa. The Rev. W. A. Adams, of Antrim, went out to South Africa a few years ago, and brought home a fine collection of stone implements, all in an unpolished state. About half of these were of the *coup de poing* type, the other half had broad cutting edges like neolithic axes. I should look on this collection as evidence of the transition from palaeolithic to neolithic, rather than as an indication of the birth-place of the *coup de poing*. The implements from Madras are similar to those from South Africa, but are not so equally divided, the *coup de poing* type being much more abundant, though such broad-edged implements as are found are exactly similar to those of the same kind from South

¹ Professor Sollas, in *Ancient Hunters*, p. 75, proposes the name "*boucher*" instead of "*coup de poing*." I agree that single short names are better than compound ones, and that "*boucher*" would be suitable; but, this not having been universally adopted, I must adhere in the present instance to the name generally known, lest I should not be understood.

Africa. I should not consider Madras or any part of India, to be the region where the coup de poing originated, as we also find evidence of transition there. I believe the place where the implement appears in greatest abundance must be looked on as its birth-place, and neither Egypt nor Somaliland can compete with North-western France and Southern England on this head. We must, therefore, look on the North of France and the South of England with the seas between, which must at the time in question have been dry land, as the birth-place of the coup de poing.

If we settle on this district as its birth-place, where are we to find the country containing the ruder implements from which the coup de poing was developed? I should say it was not southward of the coup de poing area, otherwise we should find them. I should place it to the northward, and the reason we do not find these earlier implements is owing to the country having been overrun with glaciers during the Great Ice Age, causing the surface of the country and the rude implements it contained to be swept away. If a remnant of the precursors of the coup de poing were saved I should say that some westerly corner of Europe would be the most likely place to look for them.

I may say just a few words on the dispersal of the people who made and used the coup de poing. Most people will have observed how the majority of these implements are highly weathered and their edges blunted. They must have lain for a long time exposed before they became included in the river gravels, and they must have been tossed about in water and against other stones to blunt their edges. What caused this general exposure of these implements and the blunting of their edges? It appears to me that there is but one theory that meets the case. The people abandoned their implements and workshops and fled southwards to avoid some catastrophe. Many animals and people would no doubt perish, and perhaps would be buried in snow and mud like the entombed animals in Siberia. When the appointed time came, implements and bones of animals would be swept hither and thither by floods till they found a resting place among gravels in river valleys which were then forming. Scrapers, racloirs, and points, made from flakes struck off in the manufacture of the larger implements, would be separated from their kindred, the coup de poing, by the assorting and distributing power of water, just as the smaller objects were separated from the larger during the formation of the raised-beach gravels at Larne.

CONCLUSION.

I have endeavoured to interpret the proper use and meaning of the various implements, flakes, cores, etc., found at Larne and similar sites round the coast of County Antrim, in as faithful a manner as possible. I have been aided in this by finding occasional specimens that had escaped much injury to their shapes and workmanship by repeated rolling about on the sea beach. If small and thin objects have been dispersed by the sea we still find a few that have escaped, and the cores that have been found show us that small flakes and implements must have been in general use.

The flints from the raised-beach gravels are mostly weathered a white or cream colour. A few specimens stained deep yellow, reddish-brown, or blackish, have been found in the gravels, but the flakes and implements which are much stained are more abundant on the beach of Island Magee or Kilroot. As will be seen, however, from the account I have given of the denudation now going on, or that has taken place within living memory, those specimens that have been found on the present shore must at no very distant date have been included in the raised-beach gravels. Some of the specimens that are highly stained have been found *in situ* in the gravels near the railway station at Larne Harbour, and the implement found by my daughter, Matilda C. Knowles, and myself near Kilroot, at the base of the raised-beach gravels, so firmly bedded, is a striking example, as it is highly stained a brownish-yellow colour, and is striated all over. The staining and striation must have taken place long before the raised-beach gravels commenced to form, and on account of the striae I should say the stained and striated implements belong to some one of the glacial periods. I suppose, however, the question whether the striae are glacial has to be met. Mr. Pengelly had no hesitation in calling the striae on the large implement I exhibited at Southport in 1883, glacial, and I have exhibited it and other implements at the Anthropological Institute in 1884, when the question whether the striae were glacial was put to geologists present and no one doubted the glacial character of the markings. Sir John Evans did not question the nature of the striae, though he doubted the artificial character of the chipping.

It is a question whether we have not implements of two different ages among the flints of the raised beach. Are the implements that are deeply weathered and stained, older than those from the gravels with whitish patination? I believe we may find this to be the case for the following reasons: (1) some deeply stained flints have been re-chipped and the newer chipping has whitish patination; (2) I have never seen any of the flints from the gravels with whitish patination, striated. It is only on the deeply stained implements that striae appear. I therefore believe that these implements that are so highly weathered and stained with glacial striae on their surfaces have their ages written on their faces—that they are of glacial age. I have a fair number of implements from most countries to compare with my Irish collection, and I have examined and paid attention to implements in museums of England, France, and Belgium, as well as in private collections, and I have never seen any flint implements so much weathered, or with so old a look, as those large hand weapons which I have described from Larne, Island Magee, and Kilroot; I therefore believe that in these rude implements we have a remnant saved from the great body of the precursors of the Chellean and Acheulean coups de poing of France and the South of England. Their artificial character has been doubted on several occasions, but I cannot see why antiquaries can doubt any longer, when we have cores, flakes, hammerstones and implements all weathered and stained alike, all evidently forming together one great flint industry.

Mr. J. Reid Moir, F.G.S., of Ipswich, has discovered coarsely-made flint implements in a bed forming the base of the Red Crag of Suffolk, and Sir Ray Lankester, K.C.B., has described them in a paper which he read to the Royal Society in November, 1911, "On the Discovery of a Novel Type of Flint Implement below the base of the Red Crag of Suffolk, proving the Existence of Skilled Workers in Flint in the Pliocene Age." Mr. Reginald A. Smith, of the British Museum, having called to see my collection, considered that the large pear-shaped implements from Larne, Island Magee and Kilroot were very like the sub-crag implements of Suffolk. After his return to London he communicated this information to Sir Ray Lankester, who sent me a copy of his paper and requested me to send him a few of my Irish specimens to compare with his rostro-carinate implements from the base of the Red Crag. I sent him two dozen specimens and after examining them he wrote me that "I have no doubt as to the close similarity of these flints to those from the sub-crag deposit, but there are certain differences." This was very interesting information, as I had not previously seen or heard of any implements similar to those large pear-shaped objects from Larne and other sites in the North of Ireland, which I have described on several occasions. In 1885, in one of my papers to the Royal Irish Academy "On Flint Implements from the N.E. of Ireland," I thus wrote, "The implements of palaeolithic age show such skill in workmanship that anyone must see that they were not the weapons used by man in his earliest stage of development. Anyone comparing a series of the large pear-shaped implements from the raised beach with palaeolithic weapons would find some points of likeness. There would be the heavy butt, the pear shape, and point, in both cases, but owing to the rude form and finish of the former series he would naturally conclude they were the older of the two. The palaeolithic series would appear to be a higher development of the type from the raised beach." In this statement I am comparing not all implements classed as palaeolithic, but the coups de poing only, with the large pear-shaped implements from the North of Ireland. I am still in agreement with the views I held then. I believe the rude Irish implements with their surfaces deeply stained and striated must represent the precursors of the coup de poing. The implements from the base of the Red Crag of Suffolk described by Sir Ray Lankester in the *Journal of the Royal Society* may be another portion of the precursors of the coup de poing which was saved from the general wreck, and has now been brought to light.

All the implements figured are on the $\frac{1}{2}$ linear scale.

26. Total vertical transverse circumference.
27. Pre-auricular curve.
28. Post-auricular curve.
29. Total horizontal circumference.
30. Length of the foramen occipitale magnum.
31. Breadth of the foramen occipitale magnum.
32. External bi-orbital width.
33. Nasi-alveolar length.
34. Intermalar diameter.
35. Basi-alveolar length.
36. Nasi-mental length.
37. Nasal height.
38. Nasal width.
39. Orbital width.
40. Orbital height.
41. Orbital interval.
42. Palato-maxillary length.
43. Palato-maxillary breadth indices.
44. Breadth of cephalic index.
45. Height index.
46. Breadth-height index.
47. Gnathic or alveolar index.
48. Maxillo-facial index.
49. Nasal index.
50. Orbital index.
51. Palato-maxillary index.
52. Stephano-zygomatic index.
53. Foraminal index.

The actual readings obtained upon these 42 crania by Berry and Robertson are set forth in Table 1, where the numbers in the upper horizontal refer to the nature of the observation as set forth in the text, whilst the left vertical column contains in arithmetical progression the serial numbers of the crania as set forth in Berry and Robertson's Atlas.

In Table 2, the results of each observation as calculated biometrically are set forth, together with the true mean and probable error, the standard error and probable error, as also the minimum and maximum figures. Number 48, having already been shown to be a juvenile skull, has been uniformly omitted from the calculations.

In Table 3 the generalised results of the various indices are set forth, together with the classification into which the present series of Tasmanian crania fall.

For the original record of the measurements on the crania themselves Berry and Robertson are responsible, whilst the calculations therefrom, as also the preparation of the three tables, are the work of Mr. Büchner.

TABLE 1.—THE INDIVIDUAL RESULTS OF THE EXAMINATION OF FIFTY-TWO TASMANIAN ABORIGINAL CRANIA

Serial number.																																												Indices											Serial number.	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53			
1	1,242	184	179	179	167	177	135	100	107	93	134	125	132	129	116	125	92.5	123	121	122	366	95	497	280	143	423	226	286	512	35	30	106	67	115	101	111	50	28	39	34	22	56	67	73.4	67.9	92.5	106.3	51.9	56.0	87.2	119.6	77.5	85.7	1		
2	1,450	193	191	186	178	188	142	108	111	100	138	122	126	136	113	128	107	133	135	119	387	100	522	297	145	442	239	294	533	35	29	109	73	116	106	—	56	30	40	31	23	59	68	73.6	66.3	98.1	106.0	53.6	53.6	77.5	115.2	79.1	82.8	2		
3	—	192	190	183	172	190	141	111	113	96	138	128	124	135	110	—	—	143	145	110	398	—	—	309	137	446	260	279	539	—	—	110	55	114	—	—	45	28	39	26	23	60	63	73.4	—	—	—	49.7	62.2	66.7	105	82.2	—	3		
4	—	180	179	177	165	178	136	92	104	89	131	119	119	—	107	132	—	120	143	110	363	10.0	496	287	142	431	235	269	503	33	33	100	58	—	94	—	53	26	37	34	22	—	—	75.6	73.3	97.0	94.7	—	99.1	91.9	—	100	—	4		
5	—	180	178	175	173	177	135	103	104	90	129	123	125	—	106	—	—	125	121	112	—	—	—	287	121	408	238	267	505	—	—	101	67	114	—	—	51	27	37	31	24	50	61	75.0	—	—	—	—	52.9	83.8	122	—	—	5		
6	1,115	170	169	166	165	—	132	101	104	87	130	117	116	112	115	132	116	119	132	115	366	89	488	278	130	408	233	249	482	32	27	100	60	105	91	98	43	26	37	31	22	57	69	77.6	77.6	100	102.2	49.1	57.8	83.8	103.5	82.7	84.3	6		
7	1,050	172	171	168	162	166	135	97	99	85	130	117	117	123	109	117	—	129	120	103	343	90	465	269	133	402	222	266	488	33	29	97	59	107	90	—	46	27	36	32	20	47	52	78.5	68.0	86.6	100	47.9	58.7	88.9	110.6	78.8	87.9	7		
8	1,135	175	175	171	166	177	132	112	111	97	126	116	119	124	114	126	—	126	122	110	358	92	483	280	133	413	244	255	499	34	26	107	—	110	80	99	45	32	40	32	22	—	—	75.1	72.0	95.4	86.9	—	71.1	80.0	—	90.3	76.5	8		
9	1,075	175	172	169	160	168	133	97	101	88	132	116	123	122	109	125	—	127	119	109	355	85	474	278	143	421	242	245	487	35	31	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	9			
10	1,070	170	167	165	157	164	132	100	100	83	125	119	118	—	107	121	—	120	121	101	342	93	466	280	133	413	237	237	474	34	30	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	10			
11	—	—	—	—	—	—	130	103	91	89	—	—	—	—	—	—	—	127	120	—	—	—	—	—	—	—	—	—	—	—	—	—	66	—	—	—	49	24	37	32	23	54	59	—	—	—	—	—	—	—	11					
12	1,150	190	187	186	171	188	140	112	116	97	140	122	120	132	107	139	—	130	130	121	381	106	523	311	137	448	249	277	526	36	31	109	74	120	99	—	56	24	38	31	26	50	63	73.7	73.2	99.2	93.4	56.0	42.9	81.6	126	84.8	86.1	12		
13	—	185	179	179	169	173	141	108	110	86	—	122	123	135	109	—	—	129	130	—	—	—	—	—	307	128	445	222	286	508	—	—	102	70	115	—	—	52	23	37	30	21	51	60	76.2	—	—	—	51.8	41.2	81.1	111.1	89	—	13	
14	1,140	184	183	181	166	181	137	107	105	91	135	115	114	121	101	133	109	134	127	118	379	100	519	302	130	432	232	280	512	32	30	100	60	109	97	—	47	25	36	33	21	51	67	74.5	72.3	97.0	97	78.2	53.2	91.7	131.3	86.2	93.1	14		
15	—	—	—	—	—	—	131	97	99	82	—	—	—	—	—	—	—	113	112	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	15				
16	—	179	175	177	173	173	135	98	100	88	116	117	—	123	107	136	128	123	114	119	356	102	—	295	121	416	255	248	503	34	26	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	16			
17	—	—	—	—	—	—	137	110	104	95	—	115	—	—	112	130	121	116	124	—	—	93	—	280	120	400	242	—	—	—	29	104	52	—	100	—	42	25	38	31	21	50	61	—	—	—	—	—	—	—	—	17				
18	—	181	182	177	174	178	144	—	110	95	123	123	—	121	114	127	118	133	128	118	379	92	—	310	127	437	273	253	526	31	26	103	53	115	98	—	44	26	39	36	—	56	61	78.3	69.0	81.9	96.9	43.8	59.1	92.3	108.9	—	—	—	18	
19	—	182	181	176	175	181	138	—	109	96	—	—	—	—	105	136	115	129	128	110	366	97	—	—	—	—	—	—	515	34	29	—	59	—	94	—	50	27	39	32	21	54	65	75.8	74.7	98.5	96.9	—	51.0	82.1	129.3	—	—	—	19	
20	—	179	177	172	172	177	137	—	102	96	—	—	117	—	107	131	115	121	129	110	360	94	—	305	122	427	265	234	499	35	28	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	20		
21	—	—	—	166	—	—	141	—	—	—	—	—	119	—	107	129	122	—	126	108	—	86	—	291	127	418	—	244	—	38	29	—	—	—	—	96	—	47	—	38	32	—	—	—	—	—	—	—	—	—	—	—	21			
22	—	169	—	158	—	—	—	—	—	—	—	—	—	—	—	—	—	105	129	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	22			
23	—	—	—	—	—	—	—	106	95	—	—	—	—	—	—	—	—	139	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	23		
24	—	178	172	171	171	170	126	—	102	82	—	117	—	126	—	129	—	130	118	101	—	99	—	272	110.5	382.5	236	246	482	35	30	106	62	117	103	—	46	27.5	41	34	41.5	62	65	70.8	72.5	102.3	104	49.2	58.7	82.9	104.8	—	—	—	—	24
25	—	193	191	190	187	188	132	—	109	95	—	130	—	138.5	114	136	—	130	129	119	378	103	—	286	122	408	261	269	530	39	34.5	114	73	122	110	119	51	26	42	38	37	65	66	68.4	70.5	103.0	106.8	52.6	51.0	90.5	101.5	—	—	—	—	25
26	—	179	178	175	168	178	139	—	107	91	—	114	—	121	110	124	—	122	122	113	357	93	—	282	115	397	240	263	503	39	28	102	63	107	100	—	48	25.5	39.5	36	37	58	63	77.7	69.3	89.2	107.5	52.0	54.2	90.0	108.6	—	—	—	—	26
27	—	180	176	176	173	174	136	—	101	87	—	123	—	—	105	—	—	127	126	—	—	—	—	290	123	413	250	256	506	—	—	104	59	113	—	—	45	29	40	28	38.5	54	63	75.6	—	—	—	—	61.4	70.0	116.6	—	—	—	27	
28	—	185	184	180	180	182	145	—	115	94	—	119	—	128	106	134	—	134	125	115	374	98	—	306	122	428	259	260	518	38	31	107	65	119	95	—	45	29	41	30	41	60	62	78.4	72.4	92.4	96.9	50.7	61.4	73.2	103.3	—	—	—	—	28
29	—	195	194	185	188	192	141	—	120.5	103.5	—	125	—	130	120	139	—	138	131	119	388	98	—	302	126	428	268	278	546	39.5	32	113	70	121	102	116	43	29	40	32	41	61	70	72.3	71.3	98.5	104.1	53.8	67.4	80.0	111.7	—	—	—	—	29
30	—	186	185	180	183	182	131	—	102	93	—	118	—	131	103	124	—	126	131	111	368	94	—	270	123	393	253	256	599	38	26																									

TABLE 2.

	Observation.	No.	Minimum.	True mean and P.E.	Standard deviation and P.E.	Maximum.
1	Capacity	9	1050	1225.22	202.78	1450
2	Maximum length	44	165	180.00 \pm 0.75	7.57 \pm 0.54	195
3	Ophryo-occipital length	43	163	177.87 \pm 0.75	7.56 \pm 0.54	194
4	Nasio-occipital length	44	158	174.91 \pm 0.77	7.60 \pm 0.54	190
5	Glabello-iniac length	43	157	173.00 \pm 0.74	7.27 \pm 0.54	188
6	Metopic-occipital length	41	158	176.03 \pm 0.86	8.18 \pm 0.61	192
7	Greatest breadth	47	120	134.75 \pm 0.51	5.85 \pm 0.41	145
8	Stephanic diameter	17	92	103.29 \pm 1.01	6.01 \pm 0.69	112
9	Maximum frontal diameter	46	91	106.80 \pm 0.61	6.10 \pm 0.43	121
10	Minimum frontal diameter	47	82	91.63 \pm 0.51	5.19 \pm 0.36	104
11	Temporal diameter	14	116	130.71 \pm 1.14	6.37 \pm 0.81	140
12	Bi-mastoid diameter	43	110	119.94 \pm 0.48	4.67 \pm 0.34	130
13	Bi-auricular diameter... ..	13	114	120.46 \pm 0.66	3.54 \pm 0.49	126
14	Bi-zygomatic diameter	27	121	127.86 \pm 0.86	6.64 \pm 0.61	140
15	Asterionic diameter	43	90	108.24 \pm 0.55	5.36 \pm 0.39	120
16	Basi-bregmatic height	41	112	128.54 \pm 0.63	6.04 \pm 0.44	139
17	Auriculo-bregmatic height	10	93	114.40 \pm 1.97	9.10 \pm 1.39	128
18	Frontal longitudinal arc	47	105	125.49 \pm 0.74	7.55 \pm 0.53	143
19	Parietal longitudinal arc	46	112	126.46 \pm 0.58	5.89 \pm 0.41	145
20	Occipital longitudinal arc	35	100	112.45 \pm 0.74	6.56 \pm 0.53	128
21	Sagittal curve of cranium	32	342	367.54 \pm 1.67	13.92 \pm 1.17	398
22	Basi-nasal length	40	78	95.22 \pm 0.61	5.76 \pm 0.43	106
23	Total longitudinal circumference	10	465	492.40 \pm 4.32	19.87 \pm 3.04	523
24	Vertical transverse arc	39	269	289.75 \pm 1.35	12.48 \pm 0.95	311
25	Basal transverse diameter	42	107	124.77 \pm 0.89	8.46 \pm 0.62	145
26	Total vertical trans. circumference	39	332	413.13 \pm 2.32	21.41 \pm 1.64	448
27	Pre-auricular curve	38	222	245.53 \pm 1.32	11.98 \pm 0.91	273
28	Post-auricular curve	38	232	260.42 \pm 1.60	14.52 \pm 1.12	294
29	Total horizontal circumference	38	464	506.66 \pm 1.96	17.79 \pm 1.37	546

TABLE 2—*continued.*

	Observation.	No.	Mini- mum.	True mean and P.E.	Standard devi- ation and P.E.	Maxi- mum.
30	Length for. occ. mag. ...	38	31	35.71 ± 0.31	2.88 ± 0.28	41
31	Breadth for. occ. mag. ...	39	26	29.36 ± 0.23	2.17 ± 0.16	34.5
32	External bi-orbital width ...	38	97	104.43 ± 0.47	4.29 ± 0.33	114
33	Nasi-alveolar length ...	39	52	62.56 ± 0.60	5.66 ± 0.42	76
34	Inter-malar diameter... ..	34	102	113.71 ± 0.72	6.25 ± 0.51	124
35	Basi-alveolar length ...	35	80	96.72 ± 0.77	6.80 ± 0.55	111
36	Nasi-mental length ...	12	92	105.33 ± 1.53	7.74 ± 1.06	119
37	Nasal height ...	41	41	46.88 ± 0.36	3.50 ± 0.26	56
38	Nasal width ...	40	23	27.75 ± 0.22	2.15 ± 0.16	32
39	Orbital width ...	42	36	38.81 ± 0.16	1.62 ± 0.11	42
40	Orbital height ...	43	26	31.96 ± 0.24	2.41 ± 0.17	38
41	Orbital interval ...	41	20	31.07 ± 0.77	7.40 ± 0.55	45
42	Palato-maxillary length ...	39	39	54.97 ± 0.52	4.85 ± 0.37	65
43	Palato-maxillary breadth ...	38	52	63.63 ± 0.42	3.89 ± 0.30	72

TABLE 3.

	Index.	No.	Mini- mum.	True mean and P.E.	Standard devi- ation and P.E.	Maxi- mum.	Classification.
44	Cephalic ...	43	68.4	74.98 ± 0.28	2.85 ± 0.20	80.6	Dolichocephalic.
45	Height ...	38	66.3	71.48 ± 0.30	2.73 ± 0.21	78.2	Orthocephalic.
46	Breadth-height ...	40	82	95.55 ± 0.49	4.60 ± 0.34	105	Platychocephalic.
47	Gnathic... ..	32	93	101.93 ± 0.61	5.12 ± 0.43	112.8	Mesognathous.
48	Maxillo-facial ...	23	40.7	51.70 ± 0.96	6.74 ± 0.66	78.2	Leptoprosopic.
49	Nasal ...	40	43	59.55 ± 0.72	6.96 ± 0.51	78	Platyrrhine.
50	Orbital ...	42	66.7	82.17 ± 0.65	6.20 ± 0.46	92.3	Microsemic.
51	Palato-alveolar... ..	38	102	115.17 ± 0.80	7.30 ± 0.56	131.4	Brachyuranic.
52	Stephano- zygomatic ...	11	77.5	82.00 ± 0.71	3.51 ± 0.51	90.3	Phaenozygous.
53	Foraminal ...	36	68.4	82.59 ± 0.59	5.26 ± 0.41	100	—

CEREMONIAL PERFORMANCES PERTAINING TO BIRTH,
AS PERFORMED BY THE MAORI OF NEW ZEALAND
IN PAST TIMES.

BY ELDON BEST, Dominion Museum, Wellington, N.Z.

THE ritual of the old-time religion of the natives of New Zealand has attracted some attention from writers, albeit we do not possess a great deal of detail on the subject. The causes of this paucity of information are twofold. In the first place the natives who possessed the knowledge of such details were chary of imparting information concerning them to the intrusive Europeans, for your Maori is ever conservative in these matters; in the second place, we have had but a very limited number of collectors in the field, and the majority of these have practically confined their attention to the collection of historical traditions and myths; few have turned their attention to the rites and customs of the Maori, matters that are of much greater interest than the modern history of the people, so much of which has been collected and published.

Of the many works written concerning the Maori folk, a very considerable number has been produced by persons who have not collected any information themselves, and have merely copied from other writers with wearying frequency. We are also developing a class of authorities, innocent of any knowledge of the Maori, his language, mentality, customs and religion, who yet lay down the law on these subjects with a confidence that is little less than sublime. Yet the matter published consists either of theories, or is copied, copied, and again copied. An original worker is as an oasis in the wilderness.

Again, writer after writer of this class has been telling us for a number of years past, that it is impossible to collect matter concerning the old-time customs, rites, etc., of the Maori people, that all the men of knowledge have long passed away, none remaining save the blank-minded. A modern writer remarks on "the impossibility of procuring reliable information on the details of this subject, such as the seasons for certain fish, the marks for fishing grounds, the technical names for the parts of fish hooks, etc., and traps, and more minute details of the art in general." Now all this is purely imaginary, though we admit its difficulty in the case of a writer who does not understand the Maori language, and never makes any serious attempt to collect such information. That information could be got now by any person who can converse freely with natives, who can gain their confidence, who uses a little tact, and does not antagonise the Maori, as an acquaintance of ours lately did by paying one at the rate of a shilling an hour for certain information concerning the customs, etc., of his forefathers.

We have been told repeatedly that no living Maori has any knowledge of the highest form of religion known to that people formerly, namely, the Cult of Io. Yet, in a district lately visited by the writer of these notes, he encountered no fewer than five old men who are acquainted with much of the ritual pertaining to that cult, and who also possess a vast amount of information on the old time customs, religion, mythology, technology, etc., of their race.

In proof of this statement, which we opine will be assailed by some of our friends, we give below a detailed account of the ceremonial performances enacted on the occasion of the birth of the first child of a Maori family of rank, as performed in the days that lie behind. This matter was collected by us in the year of our Lord, 1913, having been dictated to us in the Maori tongue by Te Whatahoro, of Wai-rarapa, a man seventy-three years of age, who has a great store of knowledge in connection with his people. We hope, at some future date, to publish it in the original, for it is well worth it, but this would benefit Maori linguists only.

The information here given was taught by old men in the fifties and sixties of last century.

It must first be noted that the more elaborate ceremonies about to be described were not performed over all children, but only, as a rule, over the first-born child, male or female, of a family of rank, of a chieftain of the upper class. In some cases a younger child might be so treated, or the first-born male and first-born female child of a family. Younger children, and those of lesser rank, frequently had a modified form of the Tua or Tahi rite performed over them, but children of the common class often had to get along without anything of the kind. The commoner form of the ceremony consisted principally of the dedication of a male child to the service of the god of war, and of a female child to the service of the tutelary deity, or presiding genius, of the tasks of women.

What made the higher form of the rite remarkable was the fact of the introduction into the ritual of the name of the Supreme Deity of the Maori race—Io the Parentless, Io of the Hidden Face.

Now it was in regard only to what he deemed the most important subjects and occasions, that the Maori ventured to address invocations to Io, or even to utter his name, and on no occasion was even his name mentioned on any ordinary occasion; only a few privileged persons of rank could attend such ceremonial performances. The name of Io was held in awe and respect to an extent that cannot be grasped by us, and the Maori of the early days of European settlement heard with amazement and contempt our name for the Supreme Being used in execration, and even in tones of pleasantry. Such an attitude was an impossibility among the Maori people.

All this goes to show the importance, from the Maori point of view, of the ritual pertaining to the ceremonies about to be described, and it will be well for the reader if he can adopt that view for the time being, and not bear in his mind's eye the spectacle of our christening ceremony, or even of a confirmation service.

The ceremonial matter given in this paper is as it was performed on the east coast of the North Island up to about the middle of last century. In other districts, such rites differed to some extent, hence we do not include any account of these, lest confusion overtake our readers.

In a speech made to his pupils some fifty years ago, Nepia Pohuhu, one of the last teachers of the *tapu* lore of the Maori, explained why such lore should not be divulged to Europeans, and how it was that missionaries were not allowed to become acquainted with it. The old man who gave us the following notes stated that a renowned missionary on the east coast had endeavoured to obtain an account of this ritual, but that the natives who were acquainted with it decided to withhold it, for reasons obvious to those who know the native mind, and the attitude of the average missionary towards such matters. Our old friend wound up with the remark :—

“Some isolated incidents of this ritual have indeed been divulged to Europeans, but never the ceremonial in its entirety. Now, for the first time, a white man has gained the full account. *Kua riro haepapa atu i a koe, e hara i te riro tārā.*”

All of this goes to show that, when you wish to gain an insight into the occult lore of the Maori, it is not desirable to go to him as a missionary; also that you should treat his beliefs with respect; nor try to force your own upon him; and that it is a wise thing to imitate his dignity and politeness, and treat him as you would one of your own folk whose knowledge exceeds your own, and whom you look upon as a master. Having concluded which homily, doubtless a tedious one, we proceed to our subject, with the preliminary remark that we include some explanations made in reply to queries on our part.

CONCEPTION.

When a woman of the high chieftain class of which we are writing was known to have conceived, she was not allowed to perform any laborious work; more especially was she forbidden to carry any food-products on her back (the common native way of carrying burdens), inasmuch as such an act would have a most injurious effect upon the unborn child, for, be it known, such a child is *tapu* even before birth. The proximity of food-products has ever a desecrating or polluting effect upon *tapu* persons, objects, or places

Hence it was that such a woman of the *ariki* class was provided at this time with two female attendants, termed *tapuhi*, selected from her own relatives, who were in constant attendance upon her until the birth of the child, and indeed for some time after. Their duties included those of the midwife and nurse, hence the name of *tapuhi* applied to them, from the verb *tapuhi*,—to nurse, to tend in sickness, etc. A comparative stranger, or one not nearly related to the woman, might, if so employed, work some harm to her, or to the child. The Maori world

was full of unseen dangers not heeded by us: the malign influence of demons, the dread powers of magic, greatly affected Maori thought and action.

The news of the conception of our *wahine ariki* would be received with joy by her near relatives, and indeed with much gratification by the people generally, for the members of the *ariki* class formed a division of the commune, albeit the figure-heads thereof; they belonged to the people. Such persons were treated with the highest respect, save in exceptional cases when a member showed himself, or herself, unworthy of it.

The news of her conception would also add to the fame of the woman, and cause her to be talked about, a matter of no small moment in a Maori community. But, above all, it proved that she was capable of bearing children *hei kahaki i te Kawai*, to perpetuate the line of descent.

Conception, the acquisition of form by the foetus, is termed *kunenga*, and the wise men of old maintained that the eyes were the first parts to acquire form, then the head, and then other parts. It was Io, the Supreme Being, who gave to woman the power to bear children; without this power no woman would be fruitful. In regard to the functions of sex, it was taught of old that the seed of man is with the male, and the sheltering haven with the female; the male has the kernel provided by the Deity, while the female shelters the same, and nurtures it, hence the growth of all things. For, indeed, the female is a copy of the male. The seed (of man) emanated from Io of the Hidden Face.

During the period of conception it often occurred that a woman would strongly desire a change of food, and would express a wish for a certain article of food, such as a bird, in which case her husband would make every endeavour to procure it for her. Such food was said to provide milk for the child, hence it was termed a *whakawainu*. Thus it was that Rua-here-tieke, daughter of the famous chief, Kahungunu, received her name, her mother, at such time, having been fed on the birds known as *tieke*, that were caught in a hole in a hollow tree.

One Hine-te-iwaiwa was looked upon as a kind of tutelary goddess of childbirth, as well as of all tasks performed by women. As *iwa* means nine, her name is rendered by some as "The Lady of the Nines," and the name is thought to be connected with the period of gestation in woman. This, however, seems to be but a guess. She was certainly invoked in childbirth, and some writers identify her with Hina or Sina, the personified form of the moon. Now, regarding the singular neck-pendant worn by Maori women, and termed a *heitiki*, often fashioned from nephrite, and which, although of human form, has the head sideways and the legs doubled up, it is known to every old native that this pendant is, properly, worn by women only, and herein lies the story of its origin. It is highly probable that this curious figure represents the human foetus or embryo, as indeed some old natives state, and that the wearing of it by women is a survival of, or allied to, certain acts connected with phallic symbolism of long past centuries. The figures were ever most highly prized by the Maori folk. One lately presented to the narrator is fashioned out of a whale's tooth, and is highly polished.

Now the origin of the *heitiki* in Maori myth is as follows: The first one known was made and given to Hine-te-iwaiwa by her father, and as she is the presiding genius of childbirth, the conclusion come to above seems fairly clear.

There are many beliefs and curious superstitions connected with conception and birth. For instance we know that, in former times, when natives crossed Cook Straits, any person making the trip for the first time was obliged to cover his eyes (some say that all persons had to veil their eyes), also the carved images at the bow and stern of the canoe had to be covered, lest the people looked upon the thrice *tapu* rock known as Nga Whatu. Should any person look upon it, then assuredly would disaster overtake that vessel, paddle the crew never so bravely. Also, that any women in the canoe who had conceived, were obliged not only to cover their eyes, but also closely to enshroud their abdomens.

Rite to Cause Conception.

In former times the Maori *tohunga*, or priests, occasionally performed a very singular rite over women who had, so far, proved to be sterile. So far as we can judge, this condition did not often obtain in pre-European times, though somewhat common now. As the details of the ceremony are of some interest, we here insert them. It stands as another proof of the faith of the Maori in his gods. We have collected two accounts of this ceremony, one as performed over women of rank by a priest of the higher order, and another as performed by priests of a lower class, the same being shamanistic in its details. It is the former version that is related below.

When it was found, or feared, that a woman of the higher class was *pukupa*, or barren, then the matter was referred to the principal priest of the community for his direction and manipulation. His first action was to ask the parents which sex they desired the child to be. Having ascertained this somewhat important fact, he then procured a leaf, and, with a sharp flake of flint, or obsidian, he cut the leaf into the outline of the human form, marking the features, such as eyes, nose, and mouth on it, and also indicating the sex. The woman was then conducted to a *tapu* place, where a mat was spread on the ground, on which she lay face upward. The priest then recited certain formulæ that also entered into other rites, and are a very curious and interesting illustration of Maori ethics, inasmuch as their object was to remove all evil, worldly and extraneous influences from her, to "loosen" the effects of all undesirable things or influences that had ever affected her, so as to leave her body and mind in as pure a condition as possible, as also receptive. In this state she was compared to the first woman, Hine-ahu-one (the Earth-formed Maid), formed by Tane on the *mons veneris* of the Earth Mother in the days of the gods. For the breath of life that animated Hine, as also the *wairua*, or spirit, implanted in her, had been obtained from Io, the Supreme Being, and that Being was now to be invoked in order to render this subject fruitful, even as he had vitalised Hine, the mother of mankind, and caused her to conceive; in

the days when the world was young, when gods alone held sway, and walked abroad, when man was not.

Having so prepared the subject, the priest, holding the leaf image in his hand, recited an invocation to Io to induce him to endow this woman with the *mana* (power) of Hine-ahu-one to conceive children, *i.e.*, that the subject may become fruitful, and bear a male, or female child, as the case might be.

He then opened the woman's cloak and turned it back as far as her navel, exposing her body so far. Then, standing at her feet, facing her, and holding the leaf image in his left hand, he repeated these words:—

“This child is now
A disciple of thine, O Io!
Thy breath, the breath of Hine-ahu-one,¹
May it now alight.”

Our translations are crude, but give the general meaning of the lines. Here we have an explanation of the views held by the old-time Maori priesthood. It was the supernatural power of Io, the Supreme Being, together with the *wairua* (spirit, soul) obtained from him, that vivified Hine-ahu-one, and endowed her with the power to bear children; in like manner, such power was craved for the present subject.

At the conclusion of the recital of the above, the priest placed the leaf image, face downwards, upon the woman's body, between the navel and the lower end of the breast-bone, so that the head of the image was towards the woman's head. He then covered the woman's body, drawing the cloak over the leaf, and continued his invocation.

When the priest had finished his invocation, the ceremony was over, save the *tapu* lifting rite that freed the persons engaged from restrictions imposed by that condition. The priest would take the leaf away, carefully enfold it in a piece of pliable bark, put a wrapper round it, and deposit it at some *tapu* or forbidden spot. When that woman was about to be confined, he would take the leaf to the lying-in hut, and deposit it, without the woman's knowledge, beside her pillow. It would not be shown to her until the child was born.

According to Maori belief, the *wairua* (spirit, soul) of a child is implanted in the foetus before birth, at the time when the eyes assume form, and they are the first parts so to gain form.

We may state, at this juncture, that there was also a peculiar ritual for the purpose of causing a woman's fruitfulness to cease, that she might cease to conceive. This ceremonial was termed *Taupa* or *kokoti-uru*. We have not learned the particulars of this rite, but a piece of stone was employed therein, and the woman was supposed to be made as sterile as the stone.

There is a tradition, some thirty generations old, that when a certain ancestor named Ruarangi was born, he being a first-born child, the *taupa* rite was then

¹ The breath of life is here meant, the vitalising principle.

performed over his mother, lest she should bear a daughter later on, the desire being that of male descent only.

The Maori believes that the sex of a child can be ascertained prior to birth, at least in some cases. If the dark coloured parts of the woman's breasts are extensive, then the child is a female; if smaller but darker in hue, the child is a male.

It is a curious fact that the Maori folk believe that the unborn child receives nourishment through the fontanelles, which are called *rua kai* (food holes, or apertures). When these close up, the child can no longer receive nourishment within the womb, hence it begins to move and prepare for birth. In man, the hair growing on these parts is that plucked out to be used in divers ceremonies.

THE WHARE KOHANGA, OR "NEST HOUSE."

On account of the *tapu* pertaining to both birth and death, but few persons were ever born or ever died in a dwelling-house in Maoriland. In the case of the woman we are writing of, a special hut was constructed for her occupation during the period of parturition, and for some time after. Such a hut is usually alluded to as a *whare kohanga*, but, among the Takitumu folk, a more honorific name for it is *whare puhī*. This special hut was not of any elaborate workmanship, since it was destroyed when vacated by the lying-in woman and her attendants. In most cases it would be constructed of some form of thatching material, bulrushes or reed. It was not erected within the precincts of the village, but away from it, a temporary place built in some spot where there was no likelihood of its site ever being used for a good cultivation (see *ante* for remarks on the polluting and dishonouring effects of the proximity of food), such as a stony or sandy spot on the margin of a stream. At some distance from it, not too near, a rude cooking hut, or kitchen, was erected, whereat one or two women were located whose task was to prepare food for the confined woman and her two attendants. But no communication was allowed to take place between the two parties, or at least the members of one party were not allowed to approach those of the other. When food was prepared by the cooks for the *whare kohanga* party, it was carried to a spot between the two camps, and there deposited, the bearer returning to the cooking hut. When the bearer had so returned, then one of the *tapuhī*, or attendants, left the nest house, proceeded to the spot where the meal was deposited, and carried it to the hut, where the three women partook of it. We have even heard of cases in which a third bearer was employed, and it thus took three bearers, each with her own defined stage of progress, to convey the food to the "nest house" from the vile and *tapu* destroying precincts of the cooking shed. Such are some of the disabilities pertaining to the condition known as *tapu*, the primary meaning of which term is simply "forbidden." *Tapu* ever implies restriction in some form, or in many forms, as the case may be.

Only near relatives would visit the lying-in woman while she was in the "nest

house"; these visitors remaining outside the hut; only the two attendants and the woman's husband being allowed to enter, save and except any priest whose duty was to perform some ceremony over the woman, such as will be described anon.

The "nest house" was made fairly comfortable, as far as the Maori idea of comfort goes, and in cool weather a fire was kept burning in it. This fire might be one of charcoal, or of some wood that does not make much smoke, kindled in a *takuahi*, the common native fireplace of dwelling-huts, consisting of a rectangular hole in the earthen floor, lined or bordered with four stones. But a better appreciated method of warming a "nest house" was that known as the *ahi tu popoto*. This was a singular contrivance, a form of stove that consumed itself. In this wise: a wide piece of bark of the *kahikatea* (*Podocarpus dacrydioides*) was procured and allowed to become dry, when it curls up into the form of a hollow cylinder (as is well known by us old bushmen). Several pieces of a bush vine were tied round this cylinder, and it was then set up in the earthen floor of the hut in an upright position. It was then filled with dry charcoal which, on being kindled at the top, burned slowly and steadily downward, emitting no smoke, the enclosing bark burning at the same rate as the enclosed charcoal. When all was consumed, it was replaced by another. Such a fire produces neither flame nor smoke, and considerable heat radiates from it. The lack of smoke is desirable, as it would injure the child's eyes.

A woman would adjourn to the "nest house" with her attendants when she felt her time was near, one of the signs being a numbed feeling in the small of the back. Her attendants, being near relatives, were sympathetic companions for her; she would not have anyone else near her at such a time.

We may state here that, after all ceremonial performances following the birth of the child had been duly performed, and the party had returned to the village community, then the "nest house" was destroyed. It was demolished and taken away piecemeal, together with any items, such as floor-mats, etc., used thereat, by a member of the priest class. Timbers, thatch, every item was conveyed by him to some place, probably the *turuma* or latrine, and there burned. The task of this man was to render the spot *noa*, common, or free from *tapu*, that is to take the *tapu* off it. In the execution of this function, which had its own special ritual, the parents, or the fathers of the parents of the child, would partake of food on the site of the "nest house." It would be highly improper for any unauthorized person to be the first to take food at such a place, or he might remark, in after days, "I was the first person to eat at the 'nest house' of so-and-so." This would be a belittling expression, and would assuredly cause trouble.

The *tapuhi* attend only to the woman, they have no other duties: they assist her in labour, and attend to the child. These *tapuhi* are often referred to as *puhi*, a term somewhat confusing, inasmuch as the same term was applied to a young woman of a leading family who had been brought up with special care, and treated with much distinction, having female attendants, and who was not allowed to perform any laborious work whatever. Again the word *rāuhi* is employed in a

similar sense to *tapuhi*, a *wahine rauhi* being a woman who attends a sick person, or who tends and rears children other than her own. The expression *rauhi* is also applied to a chief whose conduct towards his tribe is marked by kindly feeling and consideration.

These *tapuhi*, or attendants were not allowed to visit their homes, it is said, during their stay in the *Whare Kohanga*, or indeed to go far from it, though the female cooks might do so.

PARTURITION.

When in labour the Maori woman kneels down, with her knees wide apart. An attendant "squats" down in front of and facing her, and the two clasp each other round the body, under the arms. The attendant puts her knees against the body of her charge just below the breast-bone, and presses them downwards in order to assist expulsion.

In the event of a woman being overtaken away from home, as when in the forest or elsewhere, and if alone, then she constructs, at least in some cases, a substitute for an attendant's knees in what is termed a *pae whakaruru* or *pae whakairi*. She obtains a pole and lashes it to two small trees in a horizontal position, at such a height from the ground that, when standing by it, the pole touches her body low down. Then, when in labour, she leans against the pole and so works her body against it as to obtain the desired pressure downward. In some cases, however, no such assistance is used.

Should a woman pass the seventh day from the time that the pains of birth or symptoms of approaching birth began, without giving birth to the child, it is known that there is something wrong. This is looked upon as the limit for easy, natural parturition, and the term *rauru nui* is applied to such a birth, or to the child (*rauru* is one of the names of the umbilical cord; *nui* implies bigness). This term is limited to the period of seven days.

Should the period of seven days be passed, it is then understood that trouble is toward, and probably the woman will give birth to twins. The term *rauru whiwhia* (entangled umbilical cord) is applied to such a belated birth. If the tenth day be passed without birth, then a *materoto* (miscarriage, stillborn child) is reckoned upon. Such a condition is called a *marua-aitu* (serious misfortune).

In cases of *rauru whiwhia*, it is said that either a leg or an arm of a child will appear first, and not the head; in which case that child will turn out to be forward and disobedient, of a rebellious nature. In such cases one of the attendants would often thrust back the limb so appearing, an operation accompanied by a charm or invocation recited by the officiating priest, that individual being called in at such times of difficult parturition.

In these cases of difficult birth, a woman would sometimes be carried to the *tuahu*, or sacred place of the village community, at which many religious ceremonies were performed, and there the priest would repeat over her the following:—

“Come, O maid, in the time of fullness; bear thyself bravely before the world, even as your ancestors, Hine-titama, when trodden were the ways of earth and heavens, even the ascent to Tiritiri-o-Matangi. Strenuously pursue your course, the functions of your ancestors, Hine-ahu-one, to lie within Hui-te-rangiora. Bring thyself, O maid, to the world of life.”

The references to the first human birth herein were supposed to be effective. Hine-ahu-one was the first mortal woman, the first female of the *genus homo*, formed by Tane, and, when endowed by life, married by him, their first child being Hine-titama, the first woman to be born. Hui-te-rangiora was the abode of Tane, and is a term implying calm, peacefulness. Tiritiri-o-Matangi is the name of the eleventh heaven; in the one above which, and the last, dwells Io, the Supreme Being.

The above is merely a paraphrase of the formula chanted by the priest over the young woman. He then repeats the following to cause the child to be born in a correct manner:—

“Now I appeal to the gods of earth and heavens that they may cause you to come forth to Tahuaroa, to this world. Come, O child: tread thy path, the broad way of Tane. Bring thyself by the way of your ancestors, of Hine-titama, who brought herself forth to this world, to dwell in peace within Hui-te-ana-nui. Content shall be thy lot in the world of Life and Light, and sighs of relief proclaim the ordeal past, O child.”

Tahuaroa is a name sometimes applied to the earth; it is so used in song and myth. The “broad way of Tane” is the path or way by which the spirits of the dead pass on their way back to the fatherland of the race, the place where man originated, whence they pass down to the underworld, or ascend to the heavens, according to whether they sympathize most with the Earth Mother or the Sky Parent.

Hui-te-ana-nui is the dwelling-place erected by Tane and Tangaroa, two of the offspring of Rangi and Papa (Sky and Earth), for Hine-titama, daughter of the first woman, Hine-ahu-one (see *ante*).

Such was the mode of procedure in a case of difficult parturition, and our informant illustrates it by giving the tradition of a famous ancestress of his folk, of the Wai-rarapa district, to wit one Moe-te-ao, who flourished about ten generations ago, and whose twin sons became famed chiefs, albeit they had much difficulty in entering the world. One of them, Mahanga-tikaro, was partially born in an unusual manner, but was returned, as already explained. This occurred a second time, whereupon he was again put back, and the mother carried to the sacred place called Toka-a-Hinemoko. Here the other twin, Mahanga-puhua, was born, but not the first mentioned, hence the mother was carried to Te Wao-kairangi, where the second birth took place. That place has since been known as Nga Mahanga, or “The Twins.”

In some cases a priest repeated, during parturition, a charm to cause the child

to be born, in which occurred words expressing gratitude to the gods for their having given them a child. These words, however, seem to be principally addressed to Io, for all that enlightens man, the spirit, knowledge, and intellectual or spiritual welfare, all emanate from Io, the Supreme Being.

We now turn to some very curious notes furnished to our informant in the sixties of last century by one of the famed wise men of the east coast, some of the expressions in which are by no means easy to render into English. These remarks appear to treat of the mythical origin of birth, ere man appeared on the earth; in fact they describe the birth of the offspring of the Sky Parent and the Earth Mother, and form a very singular and interesting myth.

Those who have studied Maori myths and Maori cosmogony are aware that the word *Po* is of frequent occurrence therein. It seems to be applied to the æons, or periods of time, prior to the appearance of the offspring of the primal parents, Sky and Earth, indeed to the period before those parents came into existence; hence the term is often translated as Chaos. The ordinary meaning of the word *po* in the vernacular is "night" (*Cf. pouiri* = dark, darkness). The name is also applied to the underworld, whither spirits of the dead go. On account of the name of *Po* being so applied to the underworld, an impression prevails that it is a gloomy realm of darkness, even native accounts being sometimes tinged with this view. But, on the other hand, traditions speak of it as a world of light, wherein spirits live much as they do in this world. It would appear that the term *Po*, as applied to the period before the offspring of Earth and Sky appeared, as also to the spirit world, or the period after death, was employed as implying the Unknown, the dim inscrutable past and future into which human eyes and human mentality peer in vain.

The myth relates that the children of the primal parents lay within the Earth Mother for a period of seven *Po* (one authority says six), which corresponds with the seven nights (the Maori counted time by the nights of the moon) of the *rauru nui*, or normal period of birth. At length these children saw a dim glimmer of light, such as a glow-worm emits at night. Then one of them crept from within the *ahuru mowai* (sheltered, calm haven; a term applied to the womb), and came forth from the Earth Mother. Finding the outer world a most desirable place, he turned to persuade the others to come forth; Tane and others agreed to do so, while Whiro and yet others decided to remain within the Earth Mother. This matter caused a stir within the haven, and these (as yet unborn) children began to move within the calm haven; which movements were continued for a period of seven *Po* (equalling the seven nights of the normal period of labour). Even so, on the night that the secretions of the Earth Mother were tinged with blood, most of these offspring came forth to the world, on the seventh night of their movements within the "calm haven." They found the outer world a truly desirable place, albeit already occupied by *Wero-i-te-Ninihi*, *Maake* and *Kunawiri* (personified forms of cold), hence they nestled close to the sides of their mother for warmth. These children of the primal parents thus born during the normal *rauru nui* period, were of a kindly, desirable disposition. But some of these offspring did not appear until the

tenth night; these were Whiro, Uru, and others. Whiro especially appeared in a very peevish condition, irritated at Tane for leading them out of the Earth Mother to be assailed by cold. (Compare here the remarks on the *raura whiwhia* period of birth, *supra*.) From this time on, Whiro and Tane were enemies, and, in after times, when Whiro was defeated by Tane, the former retired to the underworld, that is he returned within the Earth Mother, with whom his sympathies lay. Whiro and others were the fractious, unruly children of the *raura whiwhia*, or belated birth period.

In Maori myth, Tane represents the male principle, as also, apparently, light, and, we are much inclined to think, the sun. Tane was the great generator, and the Maori fully grasped the powers of the sun in causing growth.

Each of the seven Po during which the movements of the above children continued, has its special name, the term Po being qualified by another word, *e.g.*, the Po-uriuri, and we may note that four of these qualifying expressions denote phases of darkness. Having given the names of these Po, the old priest continued: now if a child be born with the period of these Po, that child is said to be a *vere matua*, a *rauru nui* child, vigour and desirable qualities will be his. On the seventh night difficulties commence, and are greater on the eighth night (day). Labour has now become difficult, strenuous. If the event occurs on the Rakau-nui night (16th night of moon's age), or the Whiro night (1st day of moon's age), or in the Tangaroa nights (23rd, 24th and 25th nights of moon), these are bad nights for a woman, she will have a strenuous time; she should be carried to the *tuahu*, where a priest should attend and save her. If the time of birth is in the commencement of the month, it is not well that it should be prolonged beyond the seventh or eighth night, for such is the *rauru nui*. Should it be prolonged to the ninth or tenth, then that is *rauru whiwhia*. These be the contentious, rebellious nights. An arm or leg may first appear, the body may be sideways, then, if care be not displayed, a dead woman, a dead child, result. Such an occurrence is termed a *weu tapu*; should that child be born, it belongs to Tu (god of war). Should the period of labour occur on the eleventh night, observe carefully the moon; if a Whiro (1st day of moon's age), then will the child be (born) living; nurture it carefully; for that is a *rauru matua* (see *ante*). Should the woman's time come during the Orongonui night (28th), study the moon, as to whether it is pale hued, or has a halo round it, for if the child selects the halo (is born at such time), then will it be a child of undesirable qualities. But if it selects the pale hued moon, or a pale red, then will it be a good child and all will be well with it. The twelfth night is an evil one, it pertains to Whiro, no child will survive.

Broadly speaking, and bringing the matter to a definite statement, the two series of Po seem to represent the periods of time before and after this life. When a Maori is questioned concerning some event that occurred before he was born, he is liable to reply thus—How can I tell; I was in the Po at that time. To the period after death, such terms as "the unseen Po," and "the untouchable Po," are applied, thus implying that they are beyond human ken. This series represents the ages

of time that lie before the human soul after it leaves the body, the eternity of time in the spirit world, not of punishment or suffering, for that is a missionary teaching, but of calm and placid existence. But both periods are alike dark, in the sense of being unfathomable to the human mind; for no one has returned from the spirit world since the days of Mataora, the "broad way of Tane" is closed to all save the souls of the dead.

It is clear that the ancestors of the Maori, in common with other races, strove to fathom the unfathomable, in two directions, to peer into the past, to grasp the future. The above is part of the result, ideas evolved by a mythopoetic people, whose systems of cosmogony and anthropogeny teem with personifications of natural phenomena and objects, of intellectual power and spiritual supervision. Like unto our own ancestors, when true knowledge of such things was found to be unattainable, the Maori evolved myths to fill the place thereof. For, ever throughout the changing ages, the tale of many races, the human mind is as one.

The connection shown between the birth of the supernatural offspring of Earth and Sky, and that of man, is of interest, and is based on the belief that man is a descendant of the gods, of Tane and the "Earth-formed Maid," and that there is a spark of the divine in every man. Man is a descendant of the gods, but not of God, the Supreme Being; his connection with the latter, through Hine-ahu-one, lies in the fact that from Io came the spirit or soul, and the breath of life, by means of which Hine was vivified.

There is a common belief among some tribes that a male child is never born during an easterly or northerly wind; nor a female child during a south or west wind. This is probably connected with the fact that the term female is applied to the two first mentioned points, and that of male to the two latter. The fact that the more boisterous winds come from the west and south seems to offer an explanation of this curious nomenclature.

Return we from our digression. The umbilical cord is known by several names, as *iho*, *pito*, and *rauru*. Any items required at the time of birth of a child are prepared beforehand, and placed ready for use. For the purpose of tying the *iho*, or cord, the best material is said to be a piece of the pliant stem of a creeping plant known as *makahakaha*, that grows on sandy places, as on the sea coast. A piece of this has the outside scraped off, and is then formed into a small coil, when it is placed in water in order to keep it soft and pliable. Prior to its being required for use it would be put to soak in a small vessel of oil. In former times the oil obtained from the seed of the *titoki* tree (*Alectryon excelsum*) was used for purposes connected with the cutting of the cord. A piece of the pliable, soft inner bark of the *houhi* tree (*Hoheria populnea*) was also prepared, to be employed as a bandage. The outer and innermost layers of bark were rejected, and the soft, thin, lace-like, but strong intermediate laminæ selected for the purpose. This also was placed in water to prevent dryness and harshness.

The *iho* or cord was cut with a sharp flint flake, the cutting edge of which had been ground keen on a piece of sandstone. In the case of a high-class family, such

a flint knife might be retained for this use only, and passed down the generations as an heirloom. The principal attendant would perform the operation of cutting the cord, or possibly the grandmother of the child, if more adept. When doing so, the measure adopted was usually that termed the *konui*, that is the length of the first joint of the thumb, the cord being cut at that length from the body of the child, sometimes a little more. In some cases, however, the *koiti* was adopted, namely, the length of the little finger. This matter would be decided by an adept, and such might remark:—"This *konui* is too short; let it be the *koiti*." The cord was tied close to the body by one of the attendants prior to the cutting, and oil smeared over it, after which a short piece of the soft *houhi* bark, also oiled, was placed over it, and secured by the soft bark bandage, which was tied round the child's body. This peculiar bark retains oil well; but nowadays European fabrics are used.

The attendants examine the cord every day, and attend to it, as also to the washing of the child. In cases wherein sponge was not obtainable for the latter purpose, some *Phormium* tow was used. This tow was specially prepared, the object being to obtain a soft substance; the fibre was stripped from the leaf, scraped, soaked in water, and then scraped again so as to produce a fine soft tow, this being used as a sponge. The water was contained in a *patua*, a vessel formed in an ingenious manner from the bark of the *totara* tree (*Podocarpus totara*); it was warmed by means of placing hot stones therein.

A form of massage (*romiromi*) was performed on newly-born children, according to some natives. We have heard of cases, wherein a woman had no milk for her child, in which it was fed on the masticated flesh of young birds.

The placenta (*whenua*) is always buried, in former times at some spot near the latrine (*turuma*), or other avoided place, that the spot might not be trespassed on.

There is said to be a doubt as to the birth of twins, as they are said to change positions in some cases, hence a nail of finger or toe was often marked by the attendant, for purposes of identification. Some natives believe that the last born of twins will turn out to be the more robust of the two; others again say the opposite. It is probably more in connection with the last born of a family that the above belief holds good, and an old-time saying is "*Te potiki whakahirahira*"—the self-extolling youngest last born.

The period of seven days mentioned appears to include premonitory symptoms, and does not apply merely to the period of actual labour.

THE KOROINGO CEREMONY.

We have now to describe three ceremonies that pertained to the newly-born child, supposing that it be the first-born child of parents belonging to a leading family. There was much less ceremonial in the case of any other children born to the couple later on. The Maori was ever an upholder of the dignity and rights of primogeniture. The first of these ceremonial performances was the Koroingo or

Maioha, the greeting or welcoming of the child. The second was the Tohi, or baptism of the child, and the third was the Pure.

When the birth of the child was made known to the clans, or family groups, of the father and mother of the child, a meeting of the sub-clans nearly related to them was arranged. That meeting was called for the purpose of congratulating the parents (and relatives) on the birth of the child, and in order that the people might express their gratification at the occurrence, which meant much to a communistic folk. This assembly would take place after the tasks pertaining to birth had been performed, but prior to the falling off of the *pito* or cord. The people assembled at the "nest house," outside of which, but in the porch thereof, the mother seated herself. The child was laid on a cloak and placed in the mother's lap, the latter facing the assembled people. The child was placed in her lap with its head resting against her body, so that it also faced the people.

In the case of a male child a considerable number of gifts would be made to it, more so, apparently, than in the case of a female. The bulk of such gifts would consist of food-products, which, though consumed by the mother, were always spoken of as being for the child; they were intended as a *whakawaiu*, i.e., to form milk for the child, to cause the mother to have a plentiful supply of the same.

The presents made by the relatives of the father of the child were deposited on the plaza, apart from those given by the mother's relatives, and the former were presented first, being deposited on the ground before the recipient, after the manner Maori. When this is done, then the first speaker rises, and his first remarks consist of congratulations, after which he greets, or welcomes the child. If this speaker be a member of the father's side of the house, he congratulates the mother's side; if a relative of the mother, he congratulates the father's side, after which he greets the child by repeating the following ancient composition:—

"Welcome, O son! (If a male child). That I may greet you, who come from the calm haven to cross the threshold of Huaki-pouri, as formed by Tane at the One-i-Kurawaka, whereat was shown the wondrous powers of the gods, the sacred power of the mother. Then gathers the blood within the womb, then formed are the eyes, and Rua-i-te-pukenga and Rua-i-te-horahora are acquired. Now moves the child, to appear as a lusty babe, as a fractious one, or as stillborn, passing through the narrow way to the outer world, forcing his way to the enduring world, O son!"

This paraphrase is but a poor rendering of the original, for we are sadly lacking in the divine afflatus. The crossing of the threshold of Huaki-pouri is scarcely a translation, but it implies the end of maidenhood and motherhood acquired.

The One-i-Kurawaka was the place where Tane formed the first woman on the *mons veneris* of the Earth Mother.

The sacred power of the mother is the power to bear children, with which the first woman was endowed by Io. Without this *mana* (power) woman could not bear children.

The two Rua are personifications of knowledge; mentality, the soul, and power of thought that are now acquired.

After this greeting of the child, a ceremonial feast was held, the parents of the child eating the first portion of the food ere the company began to eat, a special basket of food being placed in the verandah of the hut for them. The rest of the people remained out in the open.

It is worthy of note that a man making a speech at such a function as this, would, on the completion of his speech, proceed to give an exhibition of his agility and powers of facial distortion, known as *pikari* and *ngangahu*, in which he pranced about, going through most amazing contortions, with glaring eyes and out-thrust tongue. This was looked upon as quite the proper thing to do, and was duly admired. It is but seldom seen now. Having finished this exhibition, he would repeat the recitation of the above effusion. This was always done among the Takitimu clans; it was considered unlucky to chant it but once.

After this, the following were chanted in the singular but euphonious monotone peculiar to the Maori:—

“Welcome, O son!

Hold fast to the sacred teaching; be quick and clear-minded to grasp the knowledge of heavenly and earthly matters, that such may be firmly retained, retained within thy mind be Rua-i-te-pukenga, Rua-i-te-horahora, and Rua-i-te-wanawana, as with Tane of old.

Welcome, O son!

Open be thy ears to listen, the ears of Rongomai-tahanui, of Rongomai-taharangi, of Tupai-whakarongo-wananga; and keep thy mind firmly on the Crown of the Heavens.

Now appears Poutu-i-te-rangi, and embraces Puke-hau-one, and Hine-rau-wharangi stretch herself forth, while commences the work of husbandman. Formed be the many mounds, let the full mounds overflow; thine be the task, O Rongo-marae-roa. Hence the abundant harvest when Maruaroa marks the opening of the year, and luscious foods abound,—O son.”

Here again the capering and grimacing performance is gone through.

One of the main objects of these singular effusions, semi-invocations as they are, teeming with references to world-old myths, was to cause a child to develop into a clear-minded, apt learner of the love of the gods, as well as of affairs connected with ordinary life. The above item contains many sacerdotal expressions, archaic and cryptic terms not met with in the vernacular, and the meaning of which is known to but very few natives now living; indeed, the meanings of some are unknown.

As observed before, the three Rua personify knowledge. The first mentioned personifies the acquisition of knowledge; the second implies the diffusion of knowledge, the power to teach, to point out right and wrong; the third stands for innate aptness, powers of observation, etc. Again, the qualifying terms following each

Rua have their meaning. Thus *pukenga* = teacher, *puke* = to rise, or increase, as water increases in volume during a freshet. *Horahora* is from *hora* = to expand. *Wanawana* is from *wana*, to bud or shoot, as a plant does, the budding out of the human mind being here personified.

The two Rongomai are two of the supernatural beings known as *whatu kura*, attendants of Io, the Supreme Being, in the uppermost of the twelve heavens. They serve as messengers, or rather as supervisors, for they are sent to inspect, and report upon the conditions of, all worlds or realms of the universe, and such reports are conveyed to Io.

Tupai was a man who dwelt in one of the Society Isles, Eastern Polynesia, at a time when the ancestors of the Maori were living there. He was in a house of learning when scholars were being taught therein, and, though not one of them, used his ears so well that he learned more than any one of them, hence his name of Tupai, the listener to occult teaching.

The Crown of the Heavens denotes the uppermost heaven, wherein dwells Io the mighty.

Now the subject changes, and, in connection with the good products presented to the child, Rongo-marae-roa, the tutelary deity, or personification of the sweet potato (the principal cultivated food product of the Maori), is invoked to cause a bounteous harvest. Rongo was one of the offspring of the primal parents, and is spoken of as the origin or parent of that tuber. All of the seventy members of that offspring produced something.

Poutu-i-te-rangi is the name of a star, the rising of which marks the commencement of the planting season. He embraces Puke-hau-one (or ahu-one), personified form of the husbandman's art, the forming of the little mounds of earth in which the *kumara* was planted, which means that the soil is prepared for the crop. Now enters Hine-rau-wharangi, a feminine personification of growth in the vegetable kingdom. The next lines call upon Rongo to fill the *puke* or little mounds with a plentiful crop, which will naturally result in a good supply of food for the Maruaroa season, late autumn, and the new year, which began with the heliacal rising of the Pleiades in June, among the east coast tribes, but with the similar rising of Rigel in the northern part of the island.

In any such function where these gifts of food were not in evidence, the latter part of the above effusion was not repeated, for such would be an unauthorised act, a sort of force appeal to the gods. In such a case the speaker would chant the following :—

“List, O Son! By one sole power, the sacred power given by the gods, was Tane enabled to ascend unto the uppermost heaven; imparted by him to Huru-te-arangi, who, with Tonganui-kaea, produced Päräwera-nui, who clave to Tawhiri-matea, whose offspring were Titi-parauri, Titi-matangi-nui, and Titi-matakākā, sent down to earth, hence the fresh breeze is felt, hence the whirlwind resounds; and now were the twelve heavens scaled,—O Son!”

Now as the reciter gave the foregoing, he carefully eliminated the part referring to Io, the reason of which is that he was among a large assembly of the people, hence he could not repeat that portion, it being too sacred. For no man might repeat the name of the Supreme Deity in any general or miscellaneous assembly of the people, or at any common or inappropriate place. But if he were reciting the above at the *tuahu*, or *tapu* spot (where many rites were performed, but only before a few privileged persons), then indeed he would repeat the whole. The part omitted is as follows :—

“List, O son ! By one sole power, the sacred power given by the gods, was Tane enabled to ascend unto the uppermost heaven, where Io the Parentless alone was seen. His is the mighty, universal power ; his the intense, unapproachable *tapu* ; his the unattainable realm, his the welfare of all things. Then Tane attained to the baptismal waters of Puhao-rangi, forbear of Oho-mai-rangi ; the cleansing waters of Hine-kauorohia Then Tane was called to the *tapu* place of Rehua at the end of the heavens, where all acquired knowledge was rendered permanent, the knowledge of portents, the knowledge of the gods ; and Tane attained the thoughts of the gods, the enduring knowledge conveyed to this world, to be here retained as a guide for all on earth,—O son !”

Under no circumstances would this portion be recited before a miscellaneous assembly of the people.

Here end these ceremonial utterances by the speaker, who then addresses his remarks to the parents of the mother of the child, greeting and congratulating them in honorific terms ; as also any other near relatives of mature age who may chance to be present ; and then the people generally, winding up with the remark :—“ You have heard the name of our grandchild ; it is for you to recite the final *hiringa*.”

This expression *hiringa* is often employed in these ritual functions, and implies assiduousness, and self-inspiration, as also the imparting of such qualities by means of such formulæ as those above given. This was a common practice among the Maori, more especially in regard to children, for such religious utterances were firmly believed to have the effect desired and intended, *vir*, the opening of the mind, to render it absorbent and retentive, to endow it with energy, determination, and a desire for the higher forms of knowledge.

Now, the speech-making by the members of the father's family having concluded, there rises a male relative of the mother, whose first act is to chant the short song known as *Whakaaraara pa* :—

“Awake and rise ! The birds are on their perches ; the sound of their singing strikes upon the ear. Awake and rise !”

The object in chanting this is to attract the attention of the people, to make them attentive, and cause them to confine their thoughts to the ritual about to be

chanted by the orator, the subject being a serious one, and the ceremonial of a religious nature. The short preliminary chant was also employed for the same purpose during the performance of a very singular ceremonial pertaining to the construction of a new *pa*, or fortified place.

The speaker, while delivering the above, stands immediately before the mother, facing the people. Having completed it, he advances to the group composed of the mother's relatives, and, standing in front of them, he faces the other group, the father's clan, while he chants the following :—

“Now do I project my mystic charm toward the gods of earth and heaven, the far-reaching power of Tu-mata-uenga. My charm is the magic power of Tane, by means of which he scaled the interspaced heavens, to the realm of life, the primal realm, the forbidden place where spiritual life is. Abide, living spirit.”

This utterance, of which the above is a very rude paraphrase, is supposed to have great effect on the mentality of the child, as also on its spiritual welfare. The final line reads “*Tihe mauri ora*”—sneeze living soul; it is a reference to the first sign of life in the first woman, the Earth-formed Maid. When the spirit or soul, and the breath of life, were implanted in the figure of earth, behold it sneezed, breathed, and opened its eyes,—a thing endowed with human life, a person, a woman.

Tu-mata-uenga was one of the offspring of the primal parents; male children were dedicated to him. These effusions seem crude in our wretched renderings, but to explain their inner meaning would mean an extremely lengthy dissertation.

Having concluded his utterance, rendered in the manner peculiar to the Maori, which we scarcely know whether to style a recitation or a chant, the speaker exercises his agility, while his whole audience join in the following pean :—

“Living soul of this world, of the world of light,—
O son!”

Meanwhile the first speaker has again risen, joined the second speaker, and the two continue the acrobatic performance described above, always facing the people.

After this, the second speaker has the field again, and recites the formula already given at p. 141, on the completion of which the whole of the people rise and chant the pæan :—

“Welcome, O son!
Welcome, O son!
To this world, to the world of light.”

The speaker then seats himself. The important part of the ceremonial is over; the above is the climax of the greeting and welcoming of the child into the world; others may now greet child and people in ordinary speech, but the ritual is over.

Now the father of one of the parents (but not the father himself) will rise and greet child and mother. Then if the paternal grandfather of the child, he will greet the mother's folk, then address his own family group. The maternal grandfather would address the other side first. There is an amazing amount of punctiliousness exhibited at such functions among the Maori.

This is the end of the ceremonial known as the Koroingo or Maioha. The latter word means to greet with affection, while the former describes the peculiar whining, whimpering sound emitted by the Maori when desirous of expressing sympathy. It is somewhat unpleasant to our ears.

A feast is, of course, provided for the persons who attend the above function.

THE TOHI RITE.

The second ceremonial performed over the child has now to be described, and there is much detail to relate, as contained in the account given us. These minute details may not be of much interest to readers; we insert them as an illustration of the extent to which ritualistic customs are carried by a comparatively primitive folk, to show the inner working of one of the many religious ceremonies of the Maori.

In the first case we may remark that the grand ceremonial feast is not partaken of at the function already described, but after the Tohi rite has been performed.

After the Koroingo function, both mother and child remain in the "nest house" until the *pito* or cord has fallen off, which occurs about the eighth day after birth, whereupon the child is taken to the water in order to undergo the Tohi, in fact to be baptized. In no wise can the ceremony be performed prior to the falling off of the cord (*iho* or *pito*); the Maori folk were ever most particular in regard to this matter. The female attendants announce the fact, and the information is conveyed to the priest, who will say:—

"To-morrow, when Tama-nui-te-ra is high up, the child will be taken to the *wai-matua* that the Tohi ceremony may be performed over it."

Tama-nui-te-ra is the personified form of the sun, a term not used in ordinary discourse, wherein *ra*=sun. *Wai matua* is a term applied to fresh water, in full "the *wai matua* of *Tuapapa*," but is not a common expression, such terms being employed only by what one might term educated persons (if such a term be admissible). The name *Tuapapa* seems to denote stratified rock, while *Rakahore* is the personified form of stones generally, as also the progenitor of such. In Maori myth *Rakahore* has two wives, who produce stones and rock. The Maori says that, were there no rock, water would not flow out of the earth, it would soak inwards. On this belief is based an old time aphorism:—

"*E kore a Parawhenua e haere ki te kore a Rakahore.*"

Parawhenua would not move abroad were it not for *Rakahore*, i.e., there would

be no flood waters were it not for rocks. Parawhenua-mea (in full) is the personified form of flood waters.

To return to our subject. At break of day next morning, the chief priest will dispatch one or two persons, probably priests of inferior rank, to select a place whereat to perform the Tohinga, or Tohi rite. A secluded spot is chosen, some place not likely to be used or trespassed on by people, a place where there is a suitable body of water, with suitable site, with proper aspect, whereon to arrange the ceremonial. The chief priest then informs the paternal and maternal grandfathers of the child (or, if these be dead, then uncles of parents) as to when the ceremony will be performed, saying:—

“At such a time our grandchild will be *tohia*; provide a *parawai* (fine cloak) for our grandchild to recline on.”

The next act is the preparation of the place where the ceremony is to be performed. The chief priest and one of lesser rank proceed to the spot, as also the two grandparents above mentioned, the latter bearing with them a fine mat, such as is used for sleeping on, and two superior garments. If the child be a male, those garments will probably be a *paepaeroa* and a *mahiti*, the former a cloak of fine texture, made of *phormium* fibre, and having a deep ornamental border; the latter a cape covered with long dog's hair.

Under the supervision of the chief priest, the two grandparents arranged the *paparoa*, or place of honour for the parents. The fine mat was spread on the earth so that one edge was close to the edge of the water, be it stream or pond. The *paepaeroa* cloak was spread on the top of the mat, and then the *mahiti* cape on top of that again. The cape being smaller than the cloak, left the highly ornamented borders of the latter exposed to view. In both cases, the *ua*, or upper parts, collars, of the garments, were placed next the water side. Both these are superior garments, worn only by persons of rank. The cape termed a *mahiti* had a ground of *phormium* fibre, on which were arranged little tufts of long hair taken from the tail of the *kuri maori*, or native dog. Each such tuft was a small piece of skin stripped from the tail with hair attached. In some cases all were white, in others one tuft of white and one of coloured hair were tied neatly together and attached to the cape. The ornamental geometric patterns of the cloak borders were worked in black, red, and white. Having arranged the *paparoa*, the two grandparents retired to take part in the procession, while the two priests prepared for their part in the performance; such preparation for religious ceremonial in Maoriland seems to have principally consisted in taking off all one's garments, and donning a scanty apron.

The procession that accompanies the child to the scene of operations starts from the “nest house,” which the mother and child now leave for good. She is accompanied by two special female attendants, one of her own family, and one of her husband's family. One of these walks in front, then comes the mother, then follows the other female attendant, then comes the father, carrying the child in his arms. After him follow the grandparents of the child, of both sexes, but no others

are allowed to attend or witness the ceremony. The function is of the severest type of *tapu*, for the name of Io, the Supreme Deity, is to be uttered.

The two priests are ready to commence the ceremony on the arrival of the procession, each being naked, save for the scanty *maro*, or apron.

The head of the procession is now close to the *paparoa*, and the chief priest enters the water, advancing until the water reaches as high as his navel. The other priest stands on the right side of the *paparoa*, which is so arranged that the persons who stand thereon facing the water have their faces toward the east; thus the chief priest is on the eastern side of the *paparoa* as he stands in the water, and the lesser priest on the south side of it.

The chief priest takes his stand in the water while performing this rite because he has to repeat the name of Io, the Supreme Being, and because of the intense *tapu* pertaining to the ritual. His position in the water was the "cleanest" to be found, in Maori eyes, with the least possibility of his being affected by polluting influences; he was, as it were, spiritually insulated for the time being, and the act was also viewed as an honouring of Io. In the ceremonial performed over a sick person, certain ritual pertaining to Io was recited in the water, and, if the patient recovered, he was taken into the water, and a ceremony performed over him. The origin of this action lies in far back times, ere man was, when Tane had to undergo the Tohi rite twice before he could enter the realm of Io.

Now, when the head of the procession reaches the *paparoa*, the foremost person, one of the female companions of the child's mother, passes behind (west of) the *paparoa* and stands immediately behind the priest on the south side of it. Then the mother advances direct to the *paparoa*, steps upon it, and takes her stand in the middle thereof, that is in the centre of the cape. Then the other female attendant takes her stand on the left side (north side) of the *paparoa*. Then the father, bearing the child, advances, passes behind the mat, along the right side of it, and steps on to the *paparoa* beside his wife, who is the only one to advance directly on to it. Then advances the paternal grandfather of the child, who bears with him the *iho* of the child (the piece of the umbilical cord that has dropped off), who takes his stand immediately behind the father, but not on the *paparoa*. Then the maternal grandfather takes up a position just behind the female attendant on the left side of the *paparoa*. Then the two grandmothers advance, and stand behind, i.e., west of, the *paparoa*. Thus, all are in position, and it will be noted that the parents and child are the only persons who occupy the *paparoa*; which arrangement is all in honour of the child.

The father then hands the child over to the mother, so holding it that it is passed head first, and the mother clasps the child to her, its head against her breast, and facing outwards, for all of these persons must face the priest standing in the water, which means that they are facing eastward.

Now the chief priest, he in the water, is known as the *tohunga tohi ora*, while the priest of lesser rank stationed to the right of the *paparoa* is termed the *tohunga whakairi*; such are their titles during the performance of the rite.

The latter priest now stretches forth his hand to receive the *iho* of the child, which was carried hither by the paternal grandfather of the child, but which, were the child a female, would have been carried by the maternal grandfather. The *iho* is contained in a small receptacle made of *raupo* (bulrush) leaves or *juncus* (rush) plaited. This receptacle had a special name which is now forgotten. This is handed over by the bearer to the priest. At the moment that the receptacle touches the hand of priest No. 2, the chief priest commences to recite the following :—

“On high let crashing thunder roar, 'tis Takamaitu, Taka-mai-i-awhea, and Taka-mai-te-ahurangi. Here am I, a proper child, a male child, of Io the Parentless, of the origin, of the acme of godlike power, of the powers of the heavens, and of Papa the Parentless. . . . Let godlike powers and mentality rest upon this child; a descendant of thy godlike offspring, O Rangi!”

The terms Taka-maitu, etc., represent personified forms of thunder. The first implies one loud crash; the second, the thunder that seems to rumble round the heavens; the third, either two or three loud reports. Papa is the Earth Mother; Rangi the Sky Parent.

As the priest concludes this recital, he dips a little water up in his right hand, and sprinkles it over the parents, as they stand on the *paparoa* at the edge of the water. He then continues :—

“The influential *iho*, the important *iho*, the parental *iho*, to thee, O Io . . Io the unseen, the origin and the acme at Tiritiri-o-Matangi.”

Tiritiri-o-Matangi is the name of the eleventh heaven.

At this juncture, says our informant, thunder would resound, without fail.

The last recitation is said to signify that the priest offers back, as it were, all the supernormal powers, knowledge, etc., that he has tampered with, deprecating his own temerity in interfering with such, a self-abasement. Quite possibly Tiritiri-o-Matangi should be Tikitiki-o-rangi, the topmost heaven, the abode of Io.

The secondary priest then hands the *iho* (cord), in its little casket, to the chief priest, who receives it in his right hand, slips it into the water, repeating as he does so—

“Uplift, uplift on high the influential *iho*, the important *iho*, the parental *iho* of this child . . . to thee, O Io of all knowledge, of Tikitiki-o-rangi.”

The last expression is the name of the uppermost of the twelve heavens. Where the blank space . . . appears, the child's name was repeated, the priest having already been made acquainted with it. Not only the parents, but also other relatives of the child would have a voice in the decision of a name.

The secondary priest, on the land, now stretches forth his left hand for the *iho* in its receptacle. The chief priest shifts it into his left hand, and hands it to him. The latter then hands it to the father of the child, who holds it on his open hand which is extended towards the chief priest.

The secondary priest then puts forth his open hands to take the child, which is laid with its head on his left hand, while his right supports its legs, so that, when he raises the child into a more upright position, much of its weight comes on his right hand, the hand that emblemises strength, and is termed the "male hand." Were the child a female, then its position on the priest's hands would be reversed, its head would be placed on his right hand, for the left is termed the "female hand."

This priest then turns and faces the chief priest, repeating as he does so these words:—

"May all evils, all misfortunes, be warded from this child, O Io the Parentless."

As the secondary priest utters these words, he is advancing towards the chief priest through the water, bearing the child with him. As he repeats the last word, he reaches the priest, and places the child on his hands, so that the head of the child rests on his left hand, and the legs on the right. The chief priest then recites the following:—

"Welcome, O son! Be eminent in noble knowledge, excel thyself in useful arts; thus shall all wisdom be permanently acquired. Come, O son! Grasp the three baskets of occult knowledge, for which Tane ascended by the whirlwind to the entrance of the uppermost heaven; when he appealed to Huru-te-arangi, who, with Tonganui-kaea, produced Päräwera-nui, who mated with Tawhiri-matea, and sent their offspring hither, and hence is felt the freshening breeze, and heard the whirling winds; for now were the twelve heavens attained, O son!"

As the priest finishes his repetition of the above, he raises his left hand so as to raise the head of the child, and then stoops so as to sink his own body in the water, until the water reaches the neck of the child. He then clasps the child to his breast with his left hand, its head resting against the upper arm. With his freed right hand, he then sprinkles a little water on the head of the child. He then rises again, and once more stands upright, while he repeats the charm to cause thunder to sound, "and the living soul, that is to say, the thunder, resounds."

Now, should that thunder resound toward the east, or the north, it is accepted as a good omen, the child will be healthy and vigorous; if toward the south or west, then misfortune lies before the child. If the thunder resounds in the south, he will probably not attain manhood.

The child is then handed over to the mother. The two parents step off the *paparoa*, and the priests turn the mat over so as to double it, with the two garments enclosed, so as to expose the ground beneath. The chief priest takes a stake about six feet long, sharpened to a point at one end, the same having been made for the occasion, and proceeds to make a hole in the ground in the centre of the spot that had been covered by the mat. He forms this hole in the usual Maori manner, as

when making a fence, by plunging the pointed end of the stake into the soil, then working it round in the hole so as to increase the diameter thereof, then plunging it in again, repeating this process until the hole is deep enough. The priest then takes the *iho* (cord) from the hand of the father, and places it in the hole, which he does with his right hand. He then reverses his tool and tamps the earth into the hole with the big end thereof, so as partially to fill the hole. He then puts some stones into the hole, that is, he places therein one stone for each night (day) that the mother was in labour with the child. He then tamps more earth in so as to cover the stones and fill the hole. As he does so he recites :—

“ Completed at Whare-rangi was the attainment of knowledge. The medium of the sacred Tohi was Apa-i-te-ihonga.”

This is a doubtful rendering, but the original is a puzzler. Whare-rangi was the abode of Tane and others of the offspring of the primal parents. The Apa mentioned was one of the attendants of Io in the uppermost heaven. The above recitation applies to the stones buried. But should the nights of labour extend to ten, then no stones are buried, for the child is going to be of a disagreeable disposition, and so also would the stones be! Nor would priests consent to stones being so buried for a stillborn child. The *iho* or *pito* is buried as a sign or proof, and the place where it was so deposited would ever after be known as the Iho of So-and-so. We know of many such place names, and but a few years ago saw an *iho* buried on the summit of a small hill near the parents' residence, the mother being one of the owners of that land, otherwise it would not have been deposited there. The spot was marked with a wooden post firmly inserted in the earth. In this case there was, we believe, no Tohi ceremony performed. It seems to have fallen into desuetude.

Should a dispute arise at any time concerning the land whereon an *iho* is buried, as over a boundary, or over the *mana* (authority of ownership) of a person or gens over such land, then the fact of such *iho* being buried is as good as a Crown Grant, and, as it is a perishable object, the stones are sought, and accepted as a proof. They were also referred to on more trivial occasions than the above.

One of our most learned men of the middle decades of last century, Te Matorohanga, of Wai-rarapa, informed his pupils that some tribes, Tuhoe for one, used to make human sacrifice at the Tohi ceremony, but that the Takitimu tribes never followed this custom (though a survival of it appears to have been retained, unrecognized as such by the natives). He said that the act of placing the child's head on a weapon (see *post*, p. 156) implied “ *he arai i te patu tangata*,” a forbidding of man slaying. Thus it seems to have been a custom formulated to put an end to human sacrifice on such occasions. The weapon took the place of the human sacrifice, and imparted a certain amount of *éclat* to the ceremony, which seems to have been the main object in a good many cases of human sacrifice among the Maori. This is an interesting illustration of culture development among a primitive and isolated folk, this abolishing of such a sacrifice on the above

occasion. Curiously enough, we are only now beginning to grasp the fact of the superior culture of the Takitimu tribes of the east coast.

In cases where such sacrifice was made in connection with the Tohi rite, the priests are said to have selected the victim. The object of the act was to enhance the prestige of the child, and of the ceremony performed over it, to render both more important in the public eye, likewise to impart to the child the fame, prestige, power, of courage and chieftainship. Men only were sacrificed on such occasions.

Some tribes, again, merely performed the Tohi and held a ceremonial feast, without any presents being made, and no *paparoa* was provided for the parents to stand on.

The elaborate form of Tohi described above is termed a *Tohi ariki*. That in which a human sacrifice was made, is a *Tohi raupara*; while the inferior form of ceremony, minus sacrifice, presents and *paparoa*, and, in some cases possibly with no appropriate feast, is known as a *Tohi kura*.

It is said that the inferior class of natives (a dangerous expression, for we never saw a native who would admit that he was a member of an inferior class) employed the Tohi kura grade of the ceremony. Now, the Tohi ariki was always performed at the proper time soon after birth, but the Tohi kura might be postponed and performed years after birth. This postponement might be owing to poverty on the part of the parents, a lack of food, or of presents, or to the death of the father. Cases have been known wherein a person was not *tohia* until he attained manhood and was tattooed. Such a belated performance might be owing to such jeering remarks as "Who are you? At what water were you *tohia*?" Or to a feeling of shame when asked such a simple question as—"Where were you *tohia*?"

We will now return to our Tohi ariki party at water side, and see to the return of the party to the village, for the Tohi ceremony is now over, and the party is about to form a procession and march back not to the "nest house," but to the village, where the Pure ceremony is to be performed before the principal house of the hamlet, or fortified village.

The burial of the stones being completed, the priest picks up the *paepaeroa* cloak and places it across the shoulders of the father of the child, and then puts the dog-skin cape over it. The father then takes the child from the mother, and holds it with his right arm, drawing the cloak over the child with his left hand. The procession then re-forms for the return, but now the father precedes the mother, carrying the child, and followed by the mother. Then come the grandmothers of the child, then the grandfathers, then the two female attendants. Prior to starting, the chief priest steps forward and places himself in front of the father, thus heading the column, while the inferior priest brings up the rear. The procession then moves off, advancing slowly to the village home, while the chief priest chants the following in a loud voice:—

"Awake and rise," etc. (see *ante*, p. 144).

The people at the village hear the voice of the priest chanting the above, and know that the ceremony is now over. The chant has notified them.

Now, should the manner in which the thunder resounded have betokened an ominous future for the child, then the above is not chanted by the priest, but he recites the following in its place:—

“Now eager are we to perform the task before us, to ignore and baffle the evil omen to protect the *tapu*. For I am *tapu*, and elated through the Parent One, the warder off of evil, the guardian of welfare. Ye shall not be affected by the evils, of this world, etc.”

The object of this charm is to ward off the effects of the evil omen of the thunder, and to preserve the child from harm. The priest thus notifies the people that he will not accept the omen quietly, but will do all in his power to baffle or avert it. The meaning of the words of the charm is obscure, hence we curtail it.

While the Tohi rite was being performed, the bulk of the people were busy in making preparations for the ceremonial feast with which the proceedings wound up.

Now there is another act of divination that was at least sometimes performed during the Tohi ceremony, but it is not certain that it was always done, probably not. There was also another mode of baptising, *i.e.*, sprinkling the child. Both of these items, which seem to have been local variations, we give here—

When the chief priest enters the water, he takes with him a small green branchlet of *mapau* (*Myrsine Urvillei*) or *tawhiri* (*Pittosporum tenuifolium*), if easily procurable, these being used in divers ritual performances, as also were *Piper excelsum* and *Coprosma robusta*. He also has six pieces of the young, unexpanded heart-leaves of some plant. We are informed that the old or outer leaves would not serve the purpose. He enters the water, and, when the people are in their places, he advances towards the mother, reciting his *karakia*, or ritual, as he advances, until he is close to her, as she stands on the *paparoa* with the child in her arms. The priest touches the child with the branchlet, and then, dipping it into the water, sprinkles drops of water from its leaves on to the child, still repeating his ritual, and sprinkling the child at a certain part thereof. It is believed that water is so employed in this ceremony because it is one of the principal elements of life, or that support life, apparently the most important one according to Maori ideas. For it was taught of old that “Water is the life of all things; without water nothing could flourish.”

Having so baptised the child, the priest casts the six pieces of grass or leaves into the stream, and the movements of these are carefully watched. Should they drift away without scattering or separating much, the fact is hailed with pleasure, it being a good omen for the child's future, he will be healthy, vigorous, clever, and will attain manhood. But should the pieces separate, and drift apart, the omen is a bad one for the child.

It is probable that the number of pieces of herbage used in this act of

divination was not confined to six, for there is some evidence to show that the pieces equalled in number the stones buried with the *iho*; but this is not assured.

Yet another variation in the baptism consists of a sprinkling of the child by the hand of the priest, no branchlet being used, after which he again dipped his hand in the water, and passed it across the child's face, as he repeated :—

“Be diligent in the performance of ritual. Be exact in thought and act. Enjoy well-being, O soul, in this world, the world of light.”

THE PURE RITE.

Ere the procession has reached the village, preparations have been made for the final ceremony, known as the *Pure*. The porch of the principal or largest house of the hamlet was prepared in much the same way as the *paparoa* for the Tohi rite. An ordinary floor-mat was spread in the porch, and over it a finely woven mat, termed a *takapau-rangi*, ornamented with woven patterns, was laid. These mats were laid to the right of the doorway, opposite the window. The *taonga*, or gifts, were displayed on these mats. Any garments, such as cloaks and capes, were spread with the upper part towards the window of the house. If a special honouring of the child is intended, then a nephrite or whalebone *patu* (a short weapon) is deposited on the top of the cloaks, below the *ua* or neck-band. If two such weapons are so deposited, they would be laid with the butt ends together, and the blades outwards. If there chanced to be among the items a *taiaha* (a highly prized carved weapon, used also as a baton), it would be laid on the upper part of the cloaks. These are the only forms of weapons so displayed, being the most highly prized; the *hoeroa*, *pounui* and others are thought much less of. This is one of the reasons why the *patu* and *taiaha* are valued so highly, because of their being used in ceremonial functions. A carved box to contain plumes might also be included among the above items.

The procession now arrives at the plaza of the village, the priest still chanting his ritual, which he will repeat several times over, until the procession halts on the plaza. The party halts near the outer plank of the porch. The priest takes his stand by the post of the facing board of the gable, while the parents of the child proceed straight towards the window, and, when the priest says :—“Step on to the *tahuaroa*,” the husband steps on to the spread cloaks, turns and faces outwards, while his wife seats herself to the right of her husband, but not on the *tahuaroa*, i.e., not on the cloaks, she remains on the projecting mat at one side.

Now, as the party were approaching the plaza, the people at the village were all assembled, and engaged in crying a welcome, even until the procession halted. This welcome was given in the vociferous Maori manner, and was accompanied by weeping, in which those of the procession following the parents joined, but whose greeting would be described by the honorific term *whakuingo*, not by the ordinary word *tangi*. Should anyone apply the latter term to it, then it would be compared to weeping for the dead.

Enough; the husband is facing outward, his wife sitting at his right hand. The paternal grandparent then steps on to the mat near the husband, but does not trespass on the *tahuaroa*. The husband pulls his cloak round until the opening thereof is in front, holding the child against his breast. The priest, standing by the post, recites the ritual given on p. 142, commencing "Welcome, O son! Hold fast to the sacred teaching," etc. He then repeats the following:—

"Welcome, O son!

Be ye wise and clever as Tane-matua, he who elevated and be-spaced the twelve heavens, when awe and fear was felt in the presence of mighty things. Then came into being the clouds and heavenly bodies, all things on earth and in ocean . . . and became truly permanent and everlasting; even to the gods of this world, to Rongomai-tuwaho, to Rongomai-whakateka, possessed, through Tane-matua, of the 'baskets' of knowledge wherefrom to chose, given by Tuhae-pawa and Io the Parentless, fixed and unalterable for all time. Then is the soul caught by Hine-titama to the Underworld,—O son!"

Rongomai-tuwaho is said to personify space, and Rongomai-whakateka the evil gods or demons of this world. Tuhae-pawa is one of the attendants of Io in the uppermost heaven. Hine-titama became Hine-nui-te-po, goddess of the Underworld.

The people now approach the porch and greet the child with words and song and tears, for this is the final greeting. When this greeting and crying is over, speeches are made, the principal sentence of which will be:—"Welcome, O son! Ye who come from within the *wai matua*" (see p 146). For this is an old, old greeting to a child just brought from the waters where the Tobi rite has been performed over it.

The persons who attended the Tohi or baptismal rite have the *tapu* removed from them by the priest, it may be at the *turuma* (latrine), or, in special cases, such as the one we are describing, at some pool of water.

The ceremonial being now over, the people partook of the ceremonial feast (*hakari*), for which food supplies in great quantity and variety would have been prepared. At such a function, the food for the priest was cooked in a separate oven, termed an *umu tārā*, while ovens (steam earth-ovens) in which food for the bulk of the people was prepared, are called *umu rauroha*.

A mat is spread on the ground outside the porch in which the parents have been seated, as a separate place for them. Seating themselves upon the mat, food is placed before them, but they cannot help themselves thereto, each parent has to be fed by one of the *tapuhi*, or female attendants, described above. This condition of *tapu*, however, does not extend beyond that day. On that day it would not be right for their hands to touch any article of food, hence it has to be placed in their mouths by the attendants. For such are the customs of the Maori.

When the parents left the porch in order to partake of the feast, the child

was laid upon the cloaks, with its head on one of the *patu*, or weapons. This implies that the child is *tapu*, and will remain so; will be reared with special care as a person of high rank, and will at no time be allowed to carry food supplies on his back, his back and head being under special *tapu* for life. He will always be allotted the sleeping place under the window, on the right-hand side as you enter a native house. Also, when visiting other places, he will be given that position in any house he occupies. For his *tapu* is that of an *ariki*, or high chief, it is hereditary; it is not as the *tapu* of a priest, for the latter may be said to pronounce his own *tapu*. The *tapu* of the child under discussion was much intensified by the performance of the baptismal ritual over him at the *wai matua*, or stream, and the fame of that ceremony would extend to all parts and to all surrounding tribes. Hence, when travelling, albeit in his old age, on arriving at distant places his fame would have preceded him, and a place prepared for him near the window of the guest's house, while each chief of the place would present him with some special dainty in the way of food, which would be laid before him. Nothing in the way of food would be withheld from, or considered too good for such a guest. This act has two aspects: it is viewed as an honouring of the guest, and also an honouring of the local *marae* or plaza (reception place). The reputation of the latter for generosity and punctilious conduct towards a noted guest has been maintained, that is to say the reputation of the local people.

Female children of high rank were sometimes accorded this higher form of the Tohi ritual, notable cases being Tamairangi of the Wellington district, Hine-matiaro of Titirangi *pa* at Uawa, and Mahina-rangi; all were chieftainesses of the Takitimu folk, and were treated with great respect by the east coast clans.

The last person to undergo the above ritual on the east coast, so far as is known to our informant, was Karauria, father of Airini, and the ceremony took place about the year 1846. It was performed at the little islet of Tapu-te-ranga, at Te Whanga-nui-a-Orotu (the inner harbour of Napier). Our informant, then a child, was not allowed to be present at the rite, and naively remarks that, although in the vicinity, he did not hear the rolling of thunder on that occasion.

Priests who officiated at any ceremonies such as the above, were not paid for their services according to any bargain made, but gifts would be made to them. In some cases, it is said, no such gift might be made after the ceremonies above described, but such offerings would be deferred until the *pokanga taringa*, or ear piercing, that is when the child's ears were pierced by the priest that pendant ornaments might be suspended therefrom. This would be performed when the child was about four years old, possibly somewhat less. But, as soon as the child could run about, a pendant, possibly of nephrite, would be suspended from its neck, at least on "company occasions." When the ear piercing was over, and it was a ceremonial affair in the case of the child of a person of importance, such a prized pendant might be taken from its neck and presented to the priest who had performed the various rites over the child. Such a gift might be supplemented with a fine cloak, in which case the cloak would be laid before the recipient, and

the ornament laid upon it. In presenting a gift to a person, the Maori does not put the object in his hands, but places it on the ground before him. As a rule, priests received the finest presents, and when several were to be recompensed, the gifts were placed before the chief priest, who gave some of them to his assistants.

The implement employed to pierce the ears would be made of albatross bone, or of human bone. In the latter case, it would be made from the bone of an enemy, and it would be known by the name of that enemy. This latter kind, it is said, were preferred for piercing the ears of a boy. Hence, if a young man's ear pendant hung well, one might ask the question: "Whose bone was it by which your ear was pierced?"—whereupon the answer might be—"E! *He toroa a rura*" (O! It was an albatross bone).

In regard to the general object of the various religious ceremonies we have described, the main idea seems to have been to endow the child with *mana atua*, supernatural power or attributes, such as the gods possess, the divine powers that emanated from Io, as also with intellectuality, etc. Absurd as it may seem to us, the Maori believes that, to some extent, man can possess such attributes. The ritual also implied a recognition of the existence of Io and of his majesty; of a belief in his power, and of the efficacy of any ritual, properly carried out, that pertained to him.

Now the different names of Io have each their own distinct meaning and application, and each is employed in its proper connection only. Thus, in the Tohi ariki rite, described above, the name of Io-matua is the one pronounced. In the Tohi taua rite, pertaining to war, the name used is Io-matakaka. In a ceremony performed in order to implant mental ability, etc., in a child, the name used was Io-mataaho, while in another performed over pupils entering the *whare wananga*, or school of occult learning, the name of Io-te-wanga was the one pronounced. Each name of Io represents a certain quality.

In the singular legend of Uenuku-titi, the offspring of the wife of Tamatea (an historical personage) by a supernatural being, occurs the following:—"The Pure was performed over Uenuku-titi, and it was proposed to take her to the water and accomplish the Tohi"; but Tamatea said,

"No, her name has already been *tohia* by her father out on the ocean."

This looks like a different order in the arrangement of the ceremonies, and the extract contains a curious usage regarding the word *tohi*. This word seems to be used in an almost generic sense in regard to divers ceremonies, even as the terms *pure* and *hou* are, but does not necessarily mean a naming. The word *tua*, however, does mean "to name," and the Tohi rite we have described is known as the Tua ceremony among some tribes. *Tohi* also means "to cut," and some think that it applies to the cutting of the navel string; and it may have been so originally, though it now seems to be used in a different sense.

In the same legend, Uenuku, the semi-divine person, asks for food, and is told that there is none prepared—"Then what is that I see covered yonder, and from

which steam arises?" replied her mother. "That is an oven of special food connected with the *Tua* rite which is about to be performed over your brother." Whereupon Tamatea said—"Uncover the oven, and let her eat the food." The reason for this extraordinary remark was the fact that Uenuku was the elder of her mother's children, hence she took precedence over her brother. No other person would have been allowed to partake of that food.

The term *pure* does not necessarily mean a removal of *tapu*, as is sometimes stated. Often it had the opposite effect. A *Pure* rite was performed over a crop in order that a good harvest might result. Many things may be *purea* in order to bring them under the care of the gods, an act which renders them *tapu*. A man may be *purea* to cause him to bear himself well in battle; a canoe may be *purea* to preserve its *mana*, to cause the gods to attend to its welfare. Hence the *pure* ceremony is, in many cases, a rite to endow the subject with *tapu* attributes and supernatural *mana* (power).

The above comprises about all the notes gathered on the subject of birth rites from the Takitimu tribes, and is fairly complete, considering that the ceremonies described have long been abolished. That some discrepancies exist between different statements made by our native friends is evident, but such is ever the case in information concerning customs that are no longer kept up, and the knowledge of which has of late been preserved orally without the special care displayed in such preservation in old Maori times.

It is interesting to note the importance of the *iho*, the portion of the umbilical cord, in the eyes of the Maori. The ordinary meaning of the word *iho* is kernel, core, or very centre.

The curious ceremony known as *oho rangi* is also of interest. The Maori firmly believes that the priests of former times possessed powers over the elements, and that they could cause thunder to resound. Several forms of ritual are said to have concluded with this performance. In such supernormal manifestations it is not the direct powers of the priest that produce them, but the ritual of the priest induces the gods to produce the desired effect. This seems to be the belief at the back of the native mind. The successful performance of this act would impart power and effectiveness to any ceremonial, such as the *Tohi*, over a child, or to a rite performed in order to restore a sick person to health.

In regard to the underworld to which descend spirits of the dead, as mentioned above, we wish to make it quite clear that, in the old Maori belief, there is no suffering or unhappiness in the spirit world, and absolutely no punishment for the soul after death, no matter what the character or acts of a person in this world may have been. In a paraphrase of an old time ritual published a few years ago, two of our Maori linguists misconstrue a mention of the underworld, and speak of it as follows:—

"To realms infernal . . . here no light appears, no single gleam; an awful gloom for ever reigns: such is the darkness of that lower world of Night Eternal. Where deposed Whiro rules and grasps with fearsome

clutch the passing dead. With horrid reptiles rules this dismal hell!
 These go to hell, the vilest spirits there . . . the place of
 sighs and groans."

Now the above is pure imagination. No word of these horrors is found in the original, nor in any other Maori song, myth, tradition or ritual. It was not a Maori belief, and we see in the myth of Mataora that life in the underworld was believed to be much purer and less gross than that of this world. The spirits of all sorts and conditions abode in the underworld. It may be all very well to be a good Christian, but why deliberately misrepresent the beliefs of another people, and credit them with a horrible myth which they never evolved or possessed, until we enlightened their ignorance.

THE CUSTOM OF TAUMAU, OR BETROTHAL.

The custom of betrothal (*taumau* or *taunaha*) in infancy was by no means uncommon among the Maori folk, and, as this occurred in some cases at the conclusion of the *Pure* ceremony over a newly-born child, we here give some account of it, as practised among the Takitimu tribes.

The *Pure* has been concluded; the ceremonial feast is over. A chief of the tribe, or possibly of another tribe, rises to speak, he says:—"My utterance: I bespeak our grandchild for"—here mentioning the name of a child of the opposite sex, and of his own clan. Now, neither the parents, nor yet any of the people will make any objection to this proposal of a betrothal, for such an act would be deemed a belittling, not only of the proposer and the child, but also of the whole clan of which they are members; it would be looked upon as an expression of contempt, and would assuredly cause trouble in the future. Supposing such an offer was refused, then, in the days that lie before, war might break out between the two peoples, and the child so asked for, be captured, in which case he would not be slain, but enslaved, that the stigma of slavery be attached to him, and the remark "a slave of mine" would be said of him, his descendants, and clan, down through generations of time. All kinds of trouble might emanate from such a refusal.

There is another point: if a well-born member of one tribe marries into another, he or she will act as a "cord" to draw that tribe to our assistance in war. The two tribes will call upon each other for assistance at such times.

In the event of a *taunaha* or bespeaking of a child being refused, the discomfited party would never expostulate, or argue about the matter. The spokesman would make one brief remark, in the form of an old time aphorism; he would rise and say:—

"*Waiho ra, e hika! He toi tipu te tangata, he toi heke.*"

That saying implies the doubtfulness of the future in regard to human well-fare. One or both of the children may not reach maturity, and while behind that

lies a hint that the refusers may regret their action in the future. In fact such a refusal is practically an insult, and is liable to bear bitter fruit in the future. "*Mo a muri, mo a nehe*"—the days that lie before will show.

Such a *taunaha* or bespeaking of a child may not take place for some time after the performance of the ceremonies described above, even years after; there is no fixed time for such a function.

We often hear interesting references to old customs in evidence given by witnesses before the native Land Court, as when, during the hearing of the case of Nga Waka-a-Kupe block, a witness remarked—"When Hikawera was born, he was bespoke by Rangitane for Waiutukura. They were (eventually) married in the house (named) Huruhuru-rautara, at Whata-manga."

When the Maori folk first saw the European method of baptising children, they did not approve of it; the general remark was "*Kaore i hangai*," meaning that it was not correctly done, it did not agree with ancient custom; the *wai matua* in Nature's own font is the only proper place at which to perform such a ceremony. As performed by the white folks, it is much more common, and less *tapu*.

The Takitimu natives have preserved an extremely old and fine invocation to Io that was recited during the Tohi ceremonial over the famous ancestor Toi, who flourished about thirty generations ago. We regret being unable to render it into English, so archaic is its form, and of so cryptic a nature its wording.

We have stated that we do not propose to insert in this account any information on the subject gathered from other tribes, inasmuch as differences are often noted in the performance of ritual among different tribes, between whom there was but little communication, and such variations would probably lead to confusion in the mind of the reader.

We now, however, propose to disregard that statement, to some extent, and insert a few notes collected many years ago by the late Mr. John White, in order that they may be placed on record.

Mr. White has a note in his MSS. to the effect that, among some tribes, a woman's father, or grandfather, or a *tohunga* (priest), would, in some cases, attend her during the period of parturition, and play upon a flute made from a bone of an ancestor of the woman or her husband, until such time as the child was born. Such a flute was looked upon as a connecting link, or medium, between the living on the one hand, and their defunct elders and ancestors, as also the gods, on the other. As most gods of the Maori are ancestral deities, deified ancestors and spirit gods that care for, cherish, warn, admonish, and also punish, their living descendants in this world, the mediumistic idea and its advantages are fairly clear. The use of such a flute would be a medium in influencing ancestral spirits to assist the woman in her trouble. This performance with the flute is said to have also been gone through if the child was ill during infancy, as also when it was getting its teeth. It was not a common custom, however, and may even have been confined to one tribe, or a small area. It is much to be regretted that Mr. White did not record his authorities, or even the localities in which he obtained his innumerable notes on

native customs, etc. This should be one of the principal cares of the collector of anthropological data.

The same authority says that, when a woman is in labour, she is attended by her parents. If she be apprehensive of trouble, or if any difficulty occurs, then a priest is called in to repeat a charm to cause the child to be born.

The child of a woman of good family is really *tapu* prior to birth, and such a woman would not be allowed to carry food on her back during the period she was in child. It may be explained here that in carrying burdens, the Maori straps them on his back, and does not use the balance pole of Eastern Polynesia.

As to the woman being attended by her parents, this custom was not followed among some tribes, or in many cases, as we have already seen.

The following brief notes concerning the Tua or Tohi ceremony were also collected by Mr. White, locality not stated.

About eight or ten days after the birth of the child, the *pito* fell off, whereupon both mother and child were conducted to the waterside, where the Tua rite was performed. One of the charms repeated over a male infant was termed the Whakangungu, and the object was to cause the child to develop into a courageous warrior and successful man-slayer, and man-eater. During the performance of the Tua ceremony, two pits were excavated near the waterside, each about two feet across, or less, and allowed to fill with water. These were termed the "male well" and "female well." Light objects were cast into these water-filled pits, from the movements of which objects on the surface of the water, certain auguries were derived by the priest concerning the future welfare, or otherwise, of the child. No details are given.

When the charm mentioned above was repeated over the child, a small reed or rush stem, to represent a weapon, was placed in his hand, the mother assisting the babe's hand to retain it. In the case of a female child, a small hank of dressed *phormium* fibre was so placed in her hand (the emblem of weaving). The *pito* was buried at the sacred place of the hamlet, and, on the return of the party to the village, a ceremonial feast was held.

Children were often so named as to commemorate some injury, defeat, or insult, sustained by the tribe, so as to keep green the memory of such wrongs.

Among the Ngati-Whatua tribe, the child was laid on a mat near the waterside. If the child were a male, the grandfather and uncles stood on the east side of the child during the ceremony, and the male cousins on the west side. A grandfather dipped a branch of *Karamu* (*Coprosma robusta*) in the water, and sprinkled the child therewith, while certain invocations were repeated, the officiating elder reciting certain portions thereof, and the cousins other portions. In the case of a female child, the grandmothers and aunts stood on the east side of the child, and the female cousins on the opposite side.

Infanticide was not infrequent among the Maori in former times, but it never assumed here the wholesale form that it had at Tahiti, and other isles of Polynesia.

More females than males were so slain, a female child not being so highly

valued as a possible fighting man. A widow might so kill her child when she lost her husband, and wives sometimes did the same on receiving some slight or insult from their husbands.

We here conclude our somewhat rambling story, the account of birth ritual as practised by the Maori, ere the white man broke through the hanging sky and reached his lone isles. Interpolations have been many, and perchance tedious, yet so numerous are the inclusions of personifications, and allusions to old myths, in such matter, that explanations are imperative.

As for the crudeness of translations and collation, we will re-quote a maxim old as the days of Tane the Fertiliser and of the Earth-formed Maid :—

“ E kore a Parawhenua e haere ki te kore a Rakahore.”

In like manner—You of the world of light cannot compile your books without material. Your anthropological data are with us in the dark places of the earth, when we camp on the trail of primitive man, and drive our roads across the *paparoa* of his baptismal font.

In one respect are we on the same plane ; for the three “ baskets ” of knowledge, obtained by Tane from Io, are open to all men alike. Each man must choose for himself the good or the evil.

Tihe mauri ora !

NATIVE STORIES FROM ULAWA.

(Contrariété Island, Solomon Islands.)

By REV. W. G. IVENS.

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Note on Orthography.—The Ulawa alphabet contains the following letters :—Vowels : a, e, i, o, u. Diphthongs : au, ae, ao, ai, ei. These are sounded as in Italian. Consonants : h ; k ; d, t ; p, q ; w ; l, r ; s ; m, n ; n, n. As in Saa (Mwala Island) there is a break in the pronunciation where g occurs in other languages, as, *e.g.*, la'o, cone-shell, Florida lago : k is hard and there is no g : n is not sounded with d, which is pronounced as dr : t is pronounced with the tongue against the teeth and the front of the palate, and approaches a sibilant ; a break sometimes represents t of neighbouring languages, *e.g.*, 'oi, break, Florida goti : q is pronounced as pw and interchanges with p in some words : r and l are distinct : the nasal m is nearly mw and is very common ; it is distinct from m, as, *e.g.*, maa, eye, maa, snake. The other consonants are sounded as in English.

(1) Hu'o Ni Moke.

(1) The Landing Net.

(1) Amadarua a Poro-suala-hanua ; ikoro a Tahimenu-'ou'ou ;
 The father of them two the Man-the stay-of-the place ; they two Tahimenu-ou'ou ;
 na a Tahimenu-lehulehu, na ro Nariiei-mane. Na kira'elu uselia na
 and Tahimenu-lehulehu, and the two Ngariei-males. And they netted a
 hu'o ni (2) moke, kira asi ha'amalaohui, kira'elu qake ta na
 net for hand netting, they then used it for first time, they not get a
 hoi i'a ta'e kele hoi (3) matasi, kira'elu ta. Oto 'amada'elu e lae
 fish, only little matasi they get. And their father he comes
 mai soira'elu, Molu lai ha'amalaohua hu'o ni moke ? " "Ta'e
 hither questions them, "You go use for first time net for hand netting ?" "Only
 kele hoi i'a melu ta." "Ka'u, hoi i'eni oto ihei ?" Na laa i puri e
 little fish we get." "Pray, fish that where ?" And person last he
 naa oto hoi i'eni. "Mane ! molu naa muniua ? molu qei
 ate it already fish that. "I say ! you ate it for what reason ? you not

ta 'akua, wa molu asi lai wa'oa na honi weieu 'akui ana
 give it for my eating, or you then go catch a bonito for me in
 lopo a Poro saune-harawaa?" Oto kira'elu nara; laa puri e nara,
 pool of Poro-saune-harawaa?" And they cried; person last he cried,
 oto aulana e tauri, "Leuna e ha'atau oa naranara?" Na ikira
 then his brother he says thus, "Place that it far off you crying?" And they
 kira neneku i (4) Ala'i. Oto kira haneia na adai (5) opu,
 they live at Ala'i. Then they climbed for a bunch young coconuts,
 oto kira inia na pute ni oha, oto kira halia na hunui pua.
 then they pick a bundle of oha, then they break off a bunch of areca nut.
 Oto kira'elu ta'e i rodo, (muni lai (6) Oa); e rodosira'elu
 Then they embarked in night (to go to Oa); it came night upon them
 i ahowaa, oto e dani lo'u, oto e rodo lo'u, e dani na kira adea
 at sea, then it light again, then it night again, it light and they see it
 hanua. A Nariemane e walaa munia a Tahimenu-'ou'ou e tauri.
 land. Ngariei-male he speaks to him Tahimenu-'ou'ou, he says thus,
 "Malau ihei, i oneni?" "Malau a Poro-saune-harawaa e ua."
 "Island where, on shore there?" "Island of Poro-saune-harawaa why."
 "Ro mane, nau si maa'u"; "oa maa'unia taha? na na malau
 "Two boys, I just fear"; "you fear it what? and the island
 ikara mola i oneni!" Oto kira'elu lai arapuu i (7) maalitawa.
 of us two just on shore there!" Then they go reach at opening.
 Kira a soira'elu, e tauri, "Na hei hou?" A Poro-saune-harawaa
 They question them, he says thus, "Who they these?" Poro-saune-harawaa
 e walaa "Na hai (8) he'imaasina, a Tahimenu-'ou'ou na a Tahimenu-
 he speaks, "The four brothers Tahimenu-'ou'ou and Tahimenu-
 lehulehu na or Nariemane." Oto kira'elu maahu ilehuna. E
 lehulehu and two Ngariei-males." Then they sleep there. It
 dani haahulei oto kira'elu lai 'esi, kira'elu a wa'owa'o waieu, na hai
 light morning and they go to sea, they fish for bonito, a four
 awala kira'elu wa'oa; oto kira'elu arapuu ione kira'elu hahii.
 ten they catch it; then they arrive on beach, they roast them.
 E dani haahulee oto kira'elu ha'i (9) lou lo'u, kira'elu he'i wa'o
 It light morning and they again fish for bonito also, they again catch
 lo'u na hai awala; kira'elu lae mai kira'elu hahii. Oto kira
 also a four ten; they come hither they roast them. Then they
 tau mae munira'elu, oto kira alasira'elu i taoha,
 make attack on them, then they laid wait for them in men's house,
 a Tahimenu-'ou'ou e dere pulu hahira'elu; oto hanueni e ma'ahu
 Tahimenu-'ou'ou he throw gall over them; then place that it slept
 mola, kira horoia oto hanueni ana hairodoni. Dani haahulee oto
 just, they killed it then place that in night that. Light morning then

kira'elu a ta'e ha'i olie'i; kira liu mei i noonooana (10) Kahua
 they embark again returning; they go by hither at point of Kahua
 i oneni; kira na'ohia 'Olu Malau, kira arapuu i Malau
 at beach there; they steered for it 'Olu Malau, they make land at Malau
 Peina, siena a Paitara-pita-wakio, e unua uri kire lae siena
 Peina, at place of Paitara-pita-wakio, he says it that they to come to him
 ione; oto kira'elu tauri, "Qaike, melu sie lae wai one,
 on shore; then they say thus, "No, we must not come on shore,
 melu a lai Malau Lalo." Kira na'ohia Malau Lalo, kira
 we are going to Malau Lalo." They steered for Malau Lalo, they
 arapuu i Hera-i-oloha, kira a lihu mei i Tawa
 made land at Hera-i-oloha, they are coasting hither at Tawa
 Odo, kira lae mai siena a Rapuanate. Oto a
 Odo, they come hither to Rapuanate. Then
 Tahimenu-'ou'ou e damuia meme 'ana a (11) Kiiramo, oto
 Tahimenu-'ou'ou he chewed a ball of food to Kiiramo, then
 a Rapuanate e huru honosira'elu; oto a Tahimenu-'ou'ou e helesia
 Rapuanate he rushed against them; then Tahimenu-'ou'ou he held it
 hoi meme, oto e unua a Rapuanate e awanana. Oto e
 the ball of food, then he bids him Rapuanate to open mouth. Then he
 uileinia e sili mola laona dawana, oto a Rapuanate e sului-
 threw it it entered just into his mouth, then Rapuanate he picks up
 ra'elu wei leni, kira'elu a ma'ahu ilehuna. Dani haahulee e hane
 them out on above, they sleep there. Light morning he climbs
 niu 'ada'elu na, e hali pua ada'elu na, e 'ini oha ada'elu.
 nuts for them and, he breaks areca nut for them and, he picks oha for them.
 E saulehi kira'elu ma'ahu, i upui rodo na kira'elu a ta'e
 It evening they slept, at middle of night and they embark
 olie'i oto i Ala'i. E rodosira'elu oto i 'esi, e ha'i
 returning to Ala'i. It came night on them at sea, it again
 rodosira'elu lo'u, e dani haahulee na kira'elu a adea oto i
 came night upon them also, it light morning and they see it at
 Ala'i. Hanueni e (12) toli 'epu isulira'elu, kira asi rono na
 Ala'i. Place that it put taboo after them, they first hear and
 kira arai i maalitawa; kira huru wei one kira unua na 'inoni
 they cry at opening; they rush to beach they supposed a man
 aopa, kira si lae wai lio odaira'elu mola ione. "Roana, na
 different, they just go and see find them right on beach. "Marry, the
 hai he'imaasina hou"; kira selineinia, wa na hai awala ni weieu
 four brothers this"; they unloaded it, and a four ten of bonito
 ana a poroni.
 for the man that.

(1) '*Amadarua*. The dual is very frequently used instead of the plural; a person of importance is always addressed in the dual.

(2) *moke* means to net the narrow openings, *tautaha*, in the shore reef as each wave comes in.

(3) *matasi*, small striped fish that lives near the rocks.

(4) *Ala'i*, name of promontory at end of Little Mwala, on East Coast.

(5) *opu*, the first edible stage of the green coconut, when the nuts are heart-shaped (*opu*=heart), *po'u-po'u* is the usual stage for eating.

(6) *Oa*, i.e., Santa Anna, off south end of San Cristoval.

(7) *maalitawa* (eye of opening), any narrow opening in the shore reef large enough for a canoe to land; *su'u* may mean a "ship harbour" or a "boat harbour."

(8) *ha'imaasina*, a Sa'a word, *ha'iulana* is the Ulawa word.

(9) *lou*, to catch bonito; *lu'u*, also, and *lo'u*, to be defiled, used of men walking under a place where women are, or of boys breaking their seclusion during the *malaohu*, initiation time.

(10) *Kahua*, Cape Keibeck on San Cristoval.

(11) *Kiiramo*, a ghost; the man ate areca nut, *oha*, and lime, and chewed it, calling on *Kiiramo*, the *meme*, ball of food, being said to be for his eating, *ana*.

(12) *toli'epu*, put place under taboo as a sign of grief; all ordinary employments would cease for the time, and the equivalent of a "fast" was proclaimed.

The Landing Net.

Their father was The-man-the-stay-of-the-land; they themselves were Tahimenu-'ou'ou, and Tahimenu-lehulehu, and the two Ngariei-males. And they netted a hand net for reef fishing, they used it for the first time; they did not get a fish, only just one little *matasi* they got. Then their father came and asked them, "Have you been to hansom your net?" "We got only one little fish," "Pray where is that fish?" Now the youngest boy had eaten the fish; "I say! why did you eat it? You did not give it to me to eat, or are you going to catch a bonito for me on the shoal of Poro-saune-harawaa?" Then they cried; the youngest cried, then said his brother, "Is that place far off that you are crying!" Now they were living at Ala'i; so they climbed and got a bunch of young coconuts, then they picked a roll of *oha* leaves, then they broke off a bunch of areca nuts. Then they embarked at night (in order to go to Oa); night came upon them at sea, then day came again, then night again, when it was day they saw the land. Ngariei-male speaks to Tahimenu-'ou'ou, and says, "What island is that, on shore there?" "Why, the island of Poro-saune-harawaa!" "Boys, I'm afraid." "What are you afraid of, when it is the island belonging to you and me on shore there?" Then they reached the entrance. They questioned them, and said, "Who are these?" Poro-saune-harawaa says, "The four brothers, Tahimenu-'ou'ou and Tahimenu-lehulehu and the two Ngariei-males." Then they slept there. Next morning at daybreak they went out to sea; they were catching bonito; they caught forty; then they came in to shore, they cooked them in the oven. When it was light next morning they went again catching bonito; they again caught forty; they came in and cooked them in the oven. Then they made an attack upon them, they laid wait for them in the canoe house, Tahimenu-'ou'ou threw gall over them, then that village just went to

sleep, they slew all the village in that night. When it was light in the morning they embarked on the return journey, they came up by the Cape of Kahua close to shore; they made for 'Olu Malau, they arrived at Malau Peina, at the place of Paitara-pita-wakio, who said that they were to come ashore there; but they said, "No, we won't come ashore, we are going to Malau Lalo." They made for Malau Lalo; they arrived at Hera-i-oloha, they coasted along to Tawa Odo, they went to Rapuanate's place. Then Tahimenu-'ou'ou chewed an areca nut calling on Kiiramo; then Rapuanate rushed to withstand them; then Tahimenu-'ou'ou held the ball of food in his hand; then he said that Rapuanate was to open his mouth. Then he threw it, it went right into his mouth; then Rapuanate helped to lift up their canoe on shore; they slept there. Next morning he climbed coconuts, and all for them, he broke off areca nuts and all, he picked *oha* for them. In the evening they slept; it was midnight and they embarked on the return journey to Ala'i. Night came upon them at sea, and again it came upon them; when it was light in the morning they saw Ala'i. The village was under taboo on their account; the first thing they heard was their shouting at the entrance; they rushed to the beach and thought it was someone else, and they went and found them right on the beach. "Marry, it is the four brothers." They unloaded, and there were forty bonito for the man.

(2) Hu'o Ni Pesi.

(2) The War Expedition over the Bows.

(1) Hu'onipesi	koro	eresia,	(2) Poro-wauru-mae,	Poru-
The expedition over bows	they two	despatched it,	Poru-wauru-mae,	Poru-

wauru-i'esi; oto e dani haahulee kira tolu pasi, oto kira alasi; kira wauru-i'esi; then it light morning they cut bows, then they scrape; they alasi mano, oto kira sili adalo, oto kira ilolo pasi, oto kira tahi scrape finish, then they go in bush for *adalo*, then they string bows, then they cut

(3) sao oto kira tari sao, oto kira 'ala'ala sao. Oto e dani sago leaves, then they split sago leaves, then they bite sago leaves. Then it light haahulee, oto kira lai sili hahona tolo i Talainiu na i Rouruhu, na morning, and they go into bush on hill at Talainiu and at Rouruhu, and i Melutei Apalolo, na i Menumaradili, na i Asuana, na i Hareli at shade of Banyan, and at Manumaradili, and at Asuana, and at Hareli Eu; kira lai sili hahona, na poo kira a odoia, wa na oha kira a odoia Eu; they go into bush above, a pig they find it, or an *oha* they to find it na kira a usia oto, wa na ohu wa na (4) reko na kira a warea and they to detach it, or a sugar-cane or a *reko* and they to pull it oto, na (5) hale koro a odoia na kira a tetea oto. Hoe, up, a *hale* they two find it and they to pick the things out. Well then, kira a aliho'i i henua, na e dani lo'u na kira ha'i lae lo'u i they return to village, and it light again and they again go also to

sili i hahona i 'Ahi'a ana haho a Rahumaea, kira a taha enter bush at over 'Ahi'a in uplands belonging to Rahumaea, they come odoia na poo na kira a roroia oto, na pua na kira a halia oto, find a pig and they to hold it firmly, an areca nut and they to break it off na oha na kira a oloia oto, na hale na kira a tetea oto. Oto an oha and they to cut it off, a hale and they to take the things out. Then kira a ha'i aliho'i lou i henua; oto e rodo paro na e dani they again return also to village; that it night beyond and it light haahulee, oto kira hai lae lo'u i sili hahona i Menitoutou, na morning, then they again go also to go in bush above at Manitoutou, and ta'a hale a poro ana a Rapupeina ilehuna na ohu, but hale belonging to the man called after Rapupeina there, the sugar-cane wa na reko ola maraana, na hui ea udiudi asia, na na hudi e or the reko thing by itself, the taro it rotting away, and the bananas it mata asia, na hale ineia e koru hula i sinaha ana uhi na (6) hana rotting away, and hale his it filled up to outside with yams and hana, na kira ha'aqasia oto kira tola manoa; oto kira aliho'i i henua, oto e and they set to they took all it; then they return to village, then it dani lo'u i haahulee a Rapupeina esi lae lio haaroia hale, e light again in morning Rapupeina he then goes sees discovers hale, he aonainia mola wau oto e alihoi mei i Su'ueta. Oto easi walaa looked at it merely then he returns hither to Su'ueta. And he then speaks munia walu tala ni tolo, muni kire siho mai isiena i one i to it eight paths of hill, that they descend hither to him at beach at Su'ueta. Oto kira taurini, "Melu qake rururu urini mai isiemu, ana Su'ueta. Then they speak thus, "We not assemble thus hither to you, for na taha melu si ruru mai?" Oto a Rapupeina esi taurini, what we then assemble hither?" Then Rapupeina he then speaks thus, (7) "Na saanau e huru i henua muni e unua kire ha'alia 'ana mai "A young man let run to village that he say they to cook for the poro ikira." Oto kira ha'alia kira tola mai i seulehi i'one. husbands their." Then they cooked they carried hither in evening to beach. Oto a Rapupeina ea soira, "Moro nau oto mai ha'aliana momona?" Oto Then Rapupeina he asks them, "You two eaten the food rich?" Then kira taurini, "Melu nau mano oto." Oto a Rapupeina ea taurini, they speak thus, "We eaten finished." Then Rapupeina he speaks thus, "Moro a qake lai kakali munia na poo." Oto kira ta mae kira "You two not go to watch for a pig." Then they took pronged spear they a lae ilaona mai wei, oto kira asi saunia na hauho, oto kira go into the streams, then they then kill it an eel, then they tolea mai kira ha'arahia. Oto nea Rapupeina ea korua duna, bring it hither they put it in the sun. Then he Rapupeina he makes a fire,

easi lae wai ta hauho, easi konia wai duna, easi ha'aereerea
 he then goes and takes eel, he then puts it on fire, he then engages it in talk
 ani seru'a, ea taurini, "Oa loosia na (8) qau 'apula mere anai ta?"
 by magic, he speaks thus, "You see it a head bloody we two shall take?"
 Oto ne hauho i duna e 'ura ileni mola e urihana e mauri. "Hoe,
 Then it eel on fire it stands upright just it as if it alive. "Now,
 mere a laelae hou kira anai ta na qau 'apula amerei?" Oto
 we two are going this they will take a head bloody from us two?" Then
 ne hauho ea 'ura lo'u ileni. Hoe, purina ana e unua mano
 it eel it stands again upright. Well then, after it when he burned finished
 hauho, easi nanalia na e u'ulo'u. Hoe, oto e rodo kira asi
 eel, it then lightened and it thundered. Well then, then it night they then
 suluta'e ana madala e (9) qaa. Oto kira asi usuli one; oto kira
 started when daystar it arose. Then they just go along beach; then they
 hula i Dei, na e ro mane ilehuna, satadarua e ro Kukapulu;
 arrive at Dai, and two men there, the names them two the two Crabs-black;
 oto koro si soia uri, "Oto ihei, Rapupeina? laa ea qake
 and they two then ask him thus, "Now whither, Rapupeina? a person he not
 qaqahē urina ilehuna, o asi liu ilehuna." Oto nea Rapupeina
 walk about thus there, you just going by there." Then he Rapupeina
 easi walaa urini, "Mere a qaqahē i Su'u Arona i suka
 he then speaks thus, "We two are going for a walk to Su'u Arona to beg
 na hoi 'e'e amerei," oto kira a hatale wau. Koro lae wau i liu
 an areca nut for us two," then they coast on. They went on and went
 i Ponuponu, na na laa na satana a Poro-wasui-ramo ilehuna. Oto
 by Ponuponu, and a person the his name Poro-wasui-ramo there. Then
 e ha'i soi lo'u uri, "Oto ihei Rapupeina?" Oto e 'alami
 he again questions also thus, "Now whither Rapupeina?" And he answered
 rerua lo'u uri, "Na'a lae i suka (10) e'e'haa 'akua i Su'u
 them two again thus, "I am going to beg wild areca nut for me at Su'u
 Arona." Oto kira hatale tarau wau i Rona, oto na laa satana Poro-
 Arona." Then they coast along to Rona, and a person his name Poro-
 nariēi-lasu ea soia a Rapupeina uri, "Oto ihei, Rapupeina?"
 ngariēi-lasu he questions him Rapupeina thus, "Now whither Rapupeina?"
 Oto e 'alamia uri, "Na'a lae paro i suka 'e'haa 'akua i
 Then he answers him thus, "I am going on to beg wild areca nut for me at
 Su'u Arona." Oto kira hatale wau maania ilehuna kira hula i
 Su'u Arona." Then they coast along from there they arrive at
 'Ironunu; hoe, kira asi opaa mai maalimae ilehuna. Oto
 Look at the Reflection; well, they then separate the hosts there. Then
 e hai awala kira liu ileni, kira asi lae i usutaha ana Su'u-ni-
 four tens they go up above, they then go to emerge at Landing-for-

keni poo wau, e hai awala poo mei ana Su'u-ni-mane. Oto mai women over beyond, four tens over hither at Landing-for-men. Then the inoni i poona kira asi esire'i na maalimae ana Su'u-ni-keni kira a people in village they then startled, and host at Landing-for-women they pola oto, na maalimae ana Su'u-ni-mane ea pola lo'u. Hoe, oto kira attack, and host at Landing-for-men it attacks also. Well, then they asi ipelu oto, oto kira ipeipelu hulaana (11) sato e ha'aqalaa one, thereupon fight then they fought until sun it desolated beach, kira asi noto. Na e ro qau 'apula mai i Su'u Arona na e hai they then desist. And two heads bloody hither at Su'u Arona and four awala ni meritaa, na i Su'u Eda e ro qau 'apula na e ro awala ni tens of wounded, and at Su'u Eda two heads bloody and two tens of meritaa. Hoe, oto a Rapupeina ea soi, "E uritaha amoroi?" Oto wounded. Well, then Rapupeina he asks, "It how with you two?" Then nea Poro-wauru-ni-mae e 'alamia e taurini, "E ro qau 'apula he Poro-wauru-ni-mae he answers him he speaks thus "Two heads bloody e hai awala ni meritaa." Hoe, oto a Poro-wauru-ni-mae ea ha'i soi lo'u four tens of wounded." Well, then Poro-wauru-ni-mae he again asks also uri, "Hoe, iomoro i enita?" Oto nea Rapupeina e 'alamia uri, thus, "Well, you two how many?" Then he Rapupeina he answers him thus "E ro qau 'apula, e ro awala ni meritaa." Oto a Rapupeina esi "Two heads bloody, two tens of wounded." Then Rapupeina he then taurini, "Esi malisiku mola, mala moro a huna." Oto nea speaks thus, "It fitting to me merely, even if you two exceed," Then he Poro-wauru-ni-mae e soi wau isulira, e tauri, "Moro a lae Poro-wauru-ni-mae he calls out after them, he speaks thus, "You two go wau moro a neku loosiemerei ana haina na haudina." Oto esi away you two wait for us two on fourth day." And he then ha'arona walu tala ni tolo i hahona i Su'u Arona; oto kira mani siho summoned eight paths of hills at over Su'u Arona; then they all descend ana saulehi ni. Oto e usuneinia lo'u na saanau muni e lae lo'u on evening that. Then he sent him also a young man that he go also i unua muni kire ha'alia diena 'ada. Oto hairodo ni kira to say it that they should cook well for them. Then night that they ha'alia taraureinia oto, kira tola mai i one. Oto easi soira cooked all through it, they carried hither to beach. And he then asks them uri, "Moro nau ha'aliana mano?" Oto kira 'alamia uri, "Mere thus, "You two eaten food finished?" Then they answer him thus, "We two nau mano oto." Oto easi unua muni kiri lai mausu, muni heitalea eaten finished." And he then bids it that they go to bush, to look for na hoi menu, oto kira tolea mai. Oto e lae wai korua na duna a egg bird, then they bring it hither. Then he went and made a fire

talana, oto e konia wai duna, easi walanía ani seru'a. E taurini, for it, then he put it on fire, he then charms it by magic. He speaks thus, "Na qau 'apula mere anai ta adarua?" Oto hoi menu ni e "A head bloody we two shall take from them two?" Then egg bird that it iduidu masi ei mola i duna; "Mala na madala mere anai jumped about the sticks right in fire; "supposing the daystar we two shall (12) qaroa adarua?" Oto hoi menuni ea rono urina, ea siki mola tie it up for them?" The egg bird that it hears thus, it jumps right maania duna ea dau ilaona (13) ahowa. Oto ea ha'i soi lo'u (14) ada from it fire it stays in air. Then he again asks also of them uri, "Na qau 'apula koro anai ta amerei wa na (15) 'ama'ama thus, "A head bloody they two shall take from us two or an ornament ni mae?" Oto hoi menuni ea siki sasala mola maania duna ea dau of fighting?" Then egg bird that it jumps clear right from it fire it stays ilaona ahowa. Hoe, oto nea Poro-wauru-ni-mae easi taurini, "Kaelu anai in air. Well, then he Poro-wauru-ni-mae he then speaks thus, "We shall hatahatale ana madala ea qaa." Oto madala e qaa kira talaee go along the coast when daystar it arises." Then daystar it arose they began ni hatale mai e hula i Rona. Oto na laa satana a Poro-to go along coast hither it arrived at Rona. Then a person his name Poro-nariei-lasu ea soia uri, "Oto ihei, Poro-wauru-ni-mae?" Oto e ngariei-lasu he asks him thus, "Now whither, Poro-wauru-ni-mae?" And he 'alamia uri, "Na'a qaqahé paro i Su'u Eda i suua mai answers him thus, "I am taking a walk beyond to Su'u Eda to pay back the piina inau." Oto e taha lo'u mei isiena laa satana Poro-yam soup my." Then he emerged also hither at place of person his name Poro-wasui-ramo, oto e ha'i soia lo'u uri, "Oto ihei, Poro-wauru-ni-wasui-ramo, then he again asks him also thus, "Now whither, Poro-wauru-ni-mae?" Oto e 'alamia lo'u uri, "Na'a lae paro i qaqahé mae?" Then he answers him again thus, "I am going beyond to take a walk i Su'u Eda, i suua mai piina inau." Oto kira hulaana poona to Su'u Eda, to pay back the yam soup my." Then they arrived at village i Dei, oto e ro mane satadarua e ro Kukapulu, koro at Dai, and two men names of them two the two Crabs-black, they two soia uri, "Oto ihei, Poro-wauru-ni-mae?" Oto e 'alamia lo'u ask him thus, "Now whither Poro-wauru-ni-mae?" Then he answers him again uri, "Na'a lae paro i qaqahé i Su'u Eda i suua mai thus, "I am going beyond to take a walk to Su'u Eda to pay back the piina inau." Oto kira hatale tarau e hulaana lehu yam soup my." Then they went along coast right along it as far as the place satana i Alana-kaula. Hoe, oto a Poro-wauru-ni-mae e taurini, "Kira its name Alanga-kaula. Well, then Poro-wauru-ni-mae he speaks thus, "They

naihei anai liu ileni?” oto kira taurini, “*Mai tolo, ana kira saea* who shall go above?” then they speak thus, “The bush people, for they know *mai lehuni.*” Oto e hai awala e liu ileni, e hai awala e liu i the places those.” Then four tens it go above, four tens it go on esi. Oto hai awala e liu ileni kira holai pola, oto maiile e sea side. Then four tens it go above they first attacked, then the ones it liu ione kira pola lo’u, oto kira a ipelu oto. Oto lai hulaana go on beach they attacked also, then they fought. Then reach up to sato e ha’aqalaa one kira asi luua ha’ilili. Oto kira lio the sun it desolated the beach they then ceased on both sides. Then they look na e ro qau ’apula e olu awala ni meritaa i Su’u i Eda, i Su’u Arona and two heads bloody three tens of wounded at Su’u Eda, at Su’u Arona e ro qau ’apula e ro awala ni meritaa. Hoe, oto a Poro-wauru-ni-mae two heads bloody two tens of wounded. Well, then Poro-wauru-ni-mae ea soi uri, “E uritaha ana Rapupeina?” Oto nea Rapupeina ea taurini, he asks thus, “It how with Rapupeina?” Then he Rapupeina he speaks thus, “Esi uritaha na e ro qau ’apula na e olu awala ni meritaa.” Oto nea “It how, and two heads bloody and three tens of wounded.” Then he a Rapupeina ea soi lo’u, “Hoe, iomoro, enita?” Oto a Poro-wauru-ni-Rapupeina he asks also, “Well, you two, how many?” Then Poro-wauru-ni-mae ea ’alamia e tauri, “Eta’e ro qau ’apula e ro awala ni mae he answers him he speaks thus, “Only two heads bloody two tens of meritaa?” Oto e taurini “Na’a lae hou, mai meritaa hou ea maritaha wounded?” Then he says, “I am going this, the wounded these it recover na kara a ha’ahua mola mae.” Oto nea Rapupeina e taurini, and we two made an end of merely fighting.” Then he Rapupeina he speaks thus, “E ua oto kara qake hele saedami ana mae, na eanai ahu oto?” “It how we two not had fill of fighting, and it shall be ended?” Oto nea Poro-wauru-ni-mae e taurini, “A! qaake, kara anai Then he Poro-wauru-ni-mae he says thus, “Ah! no, we two shall ha’ahua oto mae.” Oto nea Poro-wauru-ni-mae e holai hiria put an end to fighting.” Then he Poro-wauru-ni-mae he first pays a fine for hale a Rapupeina, e ta tanalai i’a paina, e ro (16) kaliawala hale of Rapupeina, he gives a hundred fish (teeth) big, two kaliawala e hai haa tahana. Hoe, oto nea Poro-wauru-ni-mae e taurini, four moneys a fathom. Well, then he Poro-wauru-ni-mae he speaks thus, “Moro unua i siena, mere e ahua mae?” Oto nea Poro- “You two tell it to him, we two are to end the fighting?” Then he Poro-wauru-ni-mae e holai nii tooha, e ro awala ni haa, maia na tooani wauru-ni-mae he just gives money, two tens of moneys, with a thousand i’a mai e ro kaliawala, oto nea a Rapupeina esi nii lo’u, e fish (teeth) with two kaliawala, then he Rapupeina he then gives also, ro awala ni haa, na tooani i’a, e ro kaliawala. two tens of moneys, a thousand fish (teeth), two kaliawala.

(1) *Hu'o*, net, and is used of a war expedition; the attackers are said to *āla*, i.e., to throw the net.

(2) *Poru-wauru-ni-mae*, he—who fell—and died of it; *Poru-wauru-i'esi*, he who fell at sea. *Arona* is the name of the S. Cape of Ulawa, and *Su'u Arona*, the Arona landing, is two miles north of the cape on the east coast. *Su'u i Eda* is a good boat harbour two and a half miles farther on.

(3) *Sao*, sago palm, the branches are cut off, and the leaves taken for bird arrows, *topaa*; the midrib *mudi* is very strong, and a small piece of the leaf is left at the base of the arrow. The teeth are used in default of any tool.

(4) *reko*, esculent hibiscus, planted in the gardens.

(5) *hale*, hut used for temporary storage of yams, etc., in the garden, before conveying to village, *hale*, elsewhere *vale*, *whare*, not used in Ulawa for dwelling house = *nima*.

(6) *hana*, a small yam with fine yellowish skin, and with prickly vine.

(7) *na saanau*, in war time or during initiation of lads, *malaoku*, the men lived apart on the beach in the *taoha*, and only the young men might go into the village, where the women were, without fear of defilement, *lo'u*.

(8) *gau 'apula*, bloody head, i.e., dead person.

(9) *qaa*, break—used of arising of all heavenly bodies.

(10) *'e'ehaa*, wild uncultivated areca nut, small fruit on large bunch.

(11) *Sato e ha'aqalua one*, the sun had driven people from beach, i.e., at heat of noonday.

(12) *qaroa*, used of tying up a captive pig.

(13) *ahowa*, open space, used either of open sea or of air.

(14) *soia ada*, questioned them, i.e., the ghosts.

(15) *'ama'ama*, ornaments put on during fight, belts, necklaces, bracelets, etc.

(16) *kaliawala*; the ordinary shell moneys have each four strings of various lengths—*kaliawala* has ten strings, each a fathom; *i'a*, *usu*, *sawalo* are each used to express the teeth of porpoises, dogs, flying foxes.

The War-Expedition over the Bows.

The war-expedition over the bows which the two men *Poru-wauru-mae* and *Poru-wauru-i'esi* despatched; then when it was light in the morning they cut bows, then they scraped them; after they finished scraping then they went in the bush to get bowstrings, then they bent the bows, then they cut palm-leaves (for arrows), then they cut down the sides of the leaves, then they bit them. Then it was light next morning, and they went into the bush on the hill at *Talainiu* and *Rourohu*, and *Melutei Apalolo*, and *Manumaradili*, and *Asuana*, and *Hareli Au*. They went into the bush above, did they come upon a pig, or did they come upon *oha* they were to detach it, or some sugar-cane, or some edible hibiscus they were to pluck it up, or did they come upon a yam shelter and they were to take the yams out. Well, they returned to the village, and when it was light again they went out again into the bush above *'Ahi'a*, in the uplands of *Rahumaea* (a ghost), did they come upon a pig and they were to hold it firmly, an areca palm and they were to break off the nuts, an *oha* and they were to cut it off, a yam shelter and they were to take the yams out. Then they returned to the village; then it was light next morning, then they went out again up above *Manitoutou*, but there was a yam shelter belonging to *Rapupeina* there; the sugar cane and the edible hibiscus, there was nothing like them, the taro was rotting for want of pulling up, the bananas had all rotted on the tree, and his yam shelter was filled right to the door with yams and *hana*; and they set themselves to it and took them all away, then they returned to

the village. Then when it was light again in the morning Rapupeina went and came upon his yam shelter, he just cast a look at it then he went back to Su'ueda. Then he sent a message to all the districts up on the hills, that they were to come down to the beach at Su'ueda. And they said, "We shall not gather together thus at your place, for what reason should we?" Then Rapupeina said thus "Let some young men run to the village to tell them to cook food for their husbands." Then they cooked and brought it to the beach in the evening. Then Rapupeina asks them, "Have you had rich food to eat?" Then they said, "We have eaten it all." Then says Rapupeina, "You are not going to look for a pig!" Then they took a pronged spear and went into the streams, then they killed an eel, then they brought it in and put it in the sun. Then Rapupeina makes up a fire, and goes and gets the eel, then he engages it in talk. Through magic, he says, "Can you see any killed by us?" Then the eel in the fire stood right up on end as though it were alive. "Now, in this expedition of ours are they to kill any of our number?" Then the eel stood up on end again. Now after he had finished burning the eel there was lightning and thunder. Then the night came and they set out when the daystar rose. Then they went along the shore; then they came to Dai, and there were two men there called the Two Black Crabs; and they questioned him, saying, "Whither away, Rapupeina? You are not given to travel about thus, and you are going by there." Then Rapupeina speaks thus, "We two are going to Su'u Arona to beg an areca nut to eat," and so they went along. They went by Ponuponu, and there was a man there called Poro-wasui-ramo, and he in turn questions, saying, "Whither away, Rapupeina?" Then he answers them again thus: "I am going to beg some wild areca nuts at Su'u Arona." Then they went right along the coast to Rona, and a man called Poro-ngariei-lasu questions Rapupeina saying "Whither away, Rapupeina?" Then he answers him thus: "I am going yonder to Su'u Arona to beg for a wild areca nut to eat." Then they went along the coast past there and came to Ironunu; now they divided up their bands there. Then forty went on the upper path, and came out at Su'u-ni-keni over beyond, forty were on the hither side at Su'u-ni-mwane. Then the people in the village were startled, and the band at Su'u-ni-keni had made its attack, and the band at Su'u-ni-mwane had made its attack also. And the fight then became general, and they fought till the time that the sun had driven the people away from the beach, and then they ceased. And there were two killed at Su'u Arona and forty wounded, and at Su'u Eda two killed and twenty wounded. Then Rapupeina asks, "How is it with you?" and then Poro-wauru-ni-mae answers him and says, "Two killed, forty wounded." Then Poro-wauru-ni-mae asks in his turn, "And how many with you?" and Rapupeina answers and says, "Two killed, and twenty wounded. Then Rapupeina says, "It is all one to me if you have the greater number." Then Poro-wauru-ni-mae calls after them and says, "You go and wait for us on the fourth day." Then he summoned all the districts up on the hills above Su'u Arona; and they all descended that evening. Then he sent a young man to go and tell them to cook a good meal for them. Then that night they cooked all through the night,

they carried the food to the beach. Then he asks them, "Have you finished your meal?" Then they answer him, "We have finished eating." Then he bids them go into the bush and look for a bird's egg, and they bring it. Then he went and made up a fire for it, then he put it on the fire, and he charms it with magic. He says, "Are we to get any killed of their number?" Then the egg jumps from stick to stick in the fire.¹ "Supposing we go at the rising of the daystar, shall we get it from them?" Then when the egg hears this, it jumps right up from the fire and stays in the air. Then he questions them again, saying, "Are they to get any killed of our number, or any of our fighting ornaments?" Then the egg jumps clear up from the fire and stays in the air. And so Poro-wauru-ni-mae, then says: "We shall go along the coast when the daystar rises." Then when the daystar arose they began to go along the coast as far as Rona. Then a man called Poro-ngari-ei-lasu questions him, saying, "Whither away, Poro-wauru-ni-mae?" Then he answers him, "I am going on to Su'u Eda to repay my yam soup." Then he came up to the place of the man called Poro-wasui-ramo, and he in turn questions him, saying, "Where to now, Poro-wauru-ni-mae?" And he answers him also, "I am going on to Su'u Eda, to pay back my yam soup." Then they reached the village of Dai, and there were two men called the Two Black Crabs, they questioned him saying, "Whither away, Poro-wauru-ni-mae?" And he answers saying, "I am going on to Su'u Eda, to pay back my yam soup." Then they went right along the coast as far as the place called Alanga kaula. Then Poro-wauru-ni-mae, says, "Who will go on the upper path?" then they said, "The bush people, for they know those parts." Then forty went on the upper path, and forty went by the sea. Then the forty that went on the upper path made the first attack, then those who went by the sea made an attack also, and the fighting became general. Then up till the time that the sun had driven the people away from the beach they then ceased on both sides. Then they looked and there were two killed and thirty wounded at Su'u Eda, at Su'u Arona two killed, twenty wounded. Then Poro-wauru-ni-mae asks, "How is it with Rapupeina?" Then Rapupeina says, "How should it be, and there are two killed and thirty wounded?" Then Rapupeina also asks: "And how many with you?" And Poro-wauru-ni-mae answers him and says, "Just two killed and twenty wounded." Then he says, I am going now, if these wounded recover of their wounds we must cease hostilities." Then Rapupeina says, "Why, we have not yet had our fill of fighting, and are you talking of ceasing hostilities." Then Poro-wauru-ni-mae says, "Oh! no! we must cease hostilities." Then Poro-wauru-ni-mae first pays a fine for Rapupeina's yam shelter, he gave one hundred large porpoise teeth, two shell-moneys a fathom long and each of ten strings, four shell-moneys each a fathom long of four strings. Then Poro-wauru-ni-mae says, "You tell him, that he and I are to cease hostilities." Then Poro-wauru-ni-mae was the first to pay up money, twenty shell-moneys of four strings, and a thousand porpoise teeth, and two shell-moneys

¹ In sacrificing for a fight (to secure the help of the ghosts), the bird's egg jumps from one piece of wood to another in the fire.

a fathom long, and each of ten strings. Then Rapupeina also pays up twenty shell-moneys, a thousand fish teeth, two shell-moneys a fathom long and each of ten strings.

(3) Rono Kenina. (1)

(3) Marriage Negotiations.

Kira ahua mae e mano kira si iota'i rono kenina
 They finished hostilities quite they they set about looking for wife
 nana Poro-wauru-i'esi. Oto kira tala'ae ni waai 'iola, oto kira
 for him Poro-wauru-i'esi. Then they began to hire canoes, then they
 holai waaia e ro 'iola i Su'u Eda; satadarua a Ahinai-amau na
 first hired two canoes at (2) Su'u Eda; their names Ahinai-amau and
 a Maramara-o'orou. Oto kira waaia lo'u 'Asilolia 'iola ni Dei,
 Maramara-o'orou. Then they hired also 'Asilolia canoe of Dai,
 na e ro 'iola oto ikira Diohimalau na Kalenipaewa. Oto
 and two canoes then they Descend upon the island and Child-of-shark. Then
 kira ta'elia e lima 'iola kira asi talo wau i 'esi ihahona
 they embarked on five canoes they then went round by sea over above

(3) Hu'atea, na e qaike lehu ni liu ana ahe e dau parasira
 Hu'atea, and there no place for going for waves made against them

ilehuna. Oto na laa satana a Poro-wauna-ahe ea holosia
 there. Then a person his name Poro-wauna-ahe he divides
 ahe ani seru'a, oto maholo kira liu oto na ahe easi popono
 the waves by magic, that when they passed the waves then closed
 paapau mai i purida. Oto kira hulaana ro hau satada i
 firm hither behind them. Then they arrive at two rocks their names

Raa na E Holaa, oto kira a kali wau isulia lihutaa hula
 Sunshine and It is Calm, and they rounded on on the sea journey up
 i maana Su'u i 'Ehi'a; oto kira dau kira asi
 to the entrance of landing at (4) 'Ahi'a; then they lay to they then
 uhia na ahuri ana 'iola satana Diohimalau, na walana ahuri
 blew it the conch in canoe its name Diohimalau, and its sound conch
 e tatalea (5) walu tala ni tolo ileni. Oto kira ronoa kira huru
 it go through eight paths of hills above. And they heard it they rushed
 mei i one, oto kira a soi urini, "Laena n'e e lae mai siena
 hither to beach, then they ask thus, "Party this it come hither to
 atei? isiena Sau-lada-hunu?" Oto kira taurini, "Qaike." Oto kira
 whom? to Sau-lada-hunu?" Then they speak thus, "No." And they
 asi taurini, "Amu qaike ronoa ana kira a 'iro keni nana
 then speak thus, "You not heard that they are looking for wife for him

a Poro-wauru-i'esi?" Oto kira mani puli oto i su'u i 'Ehi'a.
 Poro-wauru-i'esi?" Then they all massed at landing at 'Ahi'a.
 Oto mai mane ea tola keni, kira taurini, "Hoe, o lolosia
 Then the men bring girls, they speak thus, "Well then, you see her
 na keni e haidadana maia a Poro-wauru-i-esi?" Oto a Poro-wauru-
 a girl she equal with Poro-wauru-i'esi?" Then Poro-wauru-
 ni-mae ea tauri, "Mai keni taane i one ni, ta'a mai keni ana
 ni-mae he says thus, "Girls certainly on beach that, but girls for
 duna rakana." Oto easi tauri, "Taria 'iola i esi, kaelu e
 fire excessive." Then he says thus, "Push canoes to sea, us let begone
 laelae." Oto kira ha'i lae lo'u wau i dau i maana i su'u
 off." Then they again go also along and lay to at entrance to landing
 (6) Marada, oto kira a ha'i uhia lo'u na ahuri, e lae lo'u i
 Mwarada, then they again blow also a conch, it went again to
 tatalea walu tala ni tolo. Oto kira ronoa kira asi soi, "Laeha
 go through eight paths of hills. Then they heard it they then ask, "Party
 e lae mai isiena atei? isiena Horaoipeina?" Oto kira taurini,
 it come hither to whom? to Horaoipeina?" Then they say thus,
 "Qaike! ea lae mai isiena ihei, na kira a rono keni nana
 "No! it comes hither to him where, and they are enquiring for wife for him
 a Poro-wauru-i'esi!" Kira ruru i kaona i su'u Marada, oto
 Poro-wauru-i'esi!" They assembled at bottom at landing Mwarada, then
 e urihana na one; oto kira a taurini, "Hoe, o lolosia na
 it as if the sand; then they speak then, "Well then, you see her a
 keni mala a Poro-wauru-i'esi?" Oto a Poro-wauru-ni-mae ea taurini,
 girl like Poro-wauru-i'esi?" Then Poro-wauru-ni-mae he speaks thus,
 "Mai keni taane, ta'a mai keni ana sili amauna." Kira qake lio
 "Girls certainly, but girls for going after amau." They not see
 odoi, oto e taurini, "Moro taria paro 'iola i'esi, kaele
 find, then he speaks thus, "You two push out yonder canoes to sea, us let
 laelae." Oto kira a lae lo'u weu i dau i su'u i (7) Oha, oto
 begone." Then they go also on and lay to at landing at Oha, then
 kira a uhia ahuri lo'u, oto ma hanua ileni kira a soi lo'u, "Laeha
 they blow conch again, then the people on land they ask again, "Party
 e lae mai siena atei? isiena e hai Neresau?" Oto kira taurini,
 it come here to whom? to the four Ngeresau?" And they say thus,
 "Qaike amu qaike ronoa ana kira a rono keni nana a Poro-
 "No, you not heard it that they are enquiring for wife for him Poro-
 wauru-i'esi?" Oto kira a ha'i walaa lo'u uri, "O lolosia na keni
 wauru-i'esi?" Then they again speak also thus, "You see her a girl,
 laa, Poro-wauru-ni-mae?" Oto e taurini, "Mai keni taane, wa ta'a
 I say, Poro-wauru-ni-mae?" Then he says thus, "Girls certainly, but

mai keni ana ahina!" Oto e taurini, "Taria paro 'iola girls for living in bed chamber! Then he says thus, "Push out canoes i'esi, kaele laelae!" Oto kira lae wau i dau i kaona su'u i to sea, us let begone!" Then they went and lay to at bottom landing at (8) Lena, oto kira a uhia ahuri ana 'iola satana a 'Asilolia; oto Lenga, then they blow conch in canoe its name 'Asilolia; then kira ronoa kira ruru mei i su'u e urihana one. Oto mai they heard it they assembled hither at landing it as if sand. Then the inoni i henua kira a soi uri, "Laeha e lae mai isiena atei, people at place they ask thus, "Party it come here to whom, a Poro-ahu-tao?" Oto kira tauri, "Qaike, amu qaike manatainia ana Poro-ahu-tao?" Then they speak thus, "No, you not understood that kira a rono keni nana a Poro-wauru-i'esi?" Oto kira tauri, they are enquiring for wife for him Poro-wauru-i'esi?" Then they say thus, "Hoe, o lolosia na keni nana kalemū, laa, Poro-wauru-ni-mae?" "Well then, you see her a girl for him your son, I say, Poro-wauru-ni-mae?" Oto easi 'alamira e tauri, "Mai keni taane, wa ta'a mai keni And he then, answers them he says thus, "Girls certainly, but girls esi tewa! moro taria paro 'iola i'esi, kaele laelae lo'u." Oto kira lanky! you two push out canoes to sea, us let begone again." Then they a ha'i lae lo'u weu i dau i (9) su'u Hesimo, oto kira a ha'i uhi again go also on and lay to at landing Hasimo, and they again blow ahuri lo'u, oto kira ronoa kira ha'i soi lo'u, "Laeha ea lae mai conch also, then they heard it they again ask also, "Party it come here isiena atei, isiena e hai Saumaemae?" Oto kira a taurini, lo'u, to whom, to the four Saumaemae?" Then they speak thus again, "Kira a lae mai siena na kira a rono keni nana a Poro- "They come here to him and they are enquiring for wife for him Poro-wauru-i'esi, amu qake manatainia ua?" Oto kira a taurini, "Hoe, wauru-i'esi, you not understood it yet?" Then they speak thus, "Well then, o lolosia na keni nana a kalemū, Poro-wauru-ni-mae?" Oto e you see her a girl for your son, Poro-wauru-ni-mae?" Then he 'alamira lo'u uri, "Mai keni taane, ta'a mai keni ana hiolona! answers them again thus, "Girls certainly, but girls for starvation! moro taria mola mai 'iola i'esi, kaele laelae." Oto kira a ha'i lae you two push just the canoes to sea, us let begone." Then they again go lo'u weu i dau i kaona (10) su'u Teluhi'a, kira a uhia lo'u na also on and lie to at bottom landing Taluhi'a, they blow again the ahuri ana na 'iola satana a Maramara-o'orou, oto kira ronoa kira conch in the canoe its name Maramara-o'orou, then they heard it they a ruru mei i one e urihana na one. Oto mai inoni i assembled hither at beach it as if sand. Then the people on

henua kira soi lo'u uri, "Laeha e lae mai isiena atei, ohe isiena land they ask again thus, "Party it come here to whom, haply to a Roho-i-mae?" Oto kira a taurini, "Hoe, Poro-wauru-ni-mae Roho-i-mae?" Then they speak thus, "Well then, Poro-wauru-ni-mae o lolosia na keni nana a kalemua?" Oto e 'alamira lo'u you see her a girl for him your son?" Then he answers them again uri, "Mai keni taane, wa ta'a mai keni ana walaana neni! Moro thus, "Girls certainly, but girls for talking those! You two taria paro 'iola, kaele laelae." Oto koro lae lo'u i dau i push out canoes, us let begone." Then they two go also and lie to at

(11) Wala-ani-nimo, kira asi uhia ahuri ana 'iola satana a Ahinai-amau Wala-ani-nimo, they then blew conch in canoe its name Ahinai-amau

oto kira rono kira ruru mei e urihana one. Oto mai inoni then they hear they assembled hither it as if sand. Then the people i henua kira a soi lo'u, uri, "Laeha e lae mai isiena atei, on land they ask again, thus, "Party it come here to whom, ohe a Sau-hurei-menu?" "Kira a lae mai isiena, na amu qake haply Sau-hurei-menu?" "They come here to him, and you not

manatainia ana kira a rono keni nana a Poro-wauru-i'esi!" oto understand it that they enquire for wife for him Poro-wauru-i'esi!" then

kira a tauri, "Hoe, o lolosia na keni nana a Poro-wauru-i'esi?" they speak thus, "Well then, you see her a girl for Poro-wauru-i'esi?"

Oto e 'alamira lo'u uri, "Mai keni taane, wa ta'a mai keni ana Then he answers them again thus, "Girls certainly, but girls for suka-hariteina! taria paro lo'u mai 'iola i 'esi, kaele laelae." begging-questioning! push out again the canoes to sea, us let begone."

Oto kira kali kira asi lae wai dao i (12) Arinamanu, oto kira Then they go round they then go and lie to at Aringamanu, then they a uhia lo'u ahuri ilehuna, oto kira rono kira asi ruru lo'u blow again trumpet there, then they heard then they assembled also

mei i one e urihana na uuna one; oto mai inoni i henua hither at beach it as if particles of sand; then the people on land

kira a soi lo'u uri, "Laeha e lae mai isiena atei, a Haiparo?" they ask also thus, "Party it come here to whom Haiparo?"

Oto kira a tauri, "Ea lae mai isiena a Haiparo na kira a Then they speak thus, "It is coming here to Haiparo and they are

'iro keni nana a Poro-wauru-i'esi!" Oto kira a ha'i taurina looking for wife for him Poro-wauru-i'esi!" Then they again speak thus

lo'u, "Hoe Poro-wauru-ni-mae, oa lolosia na keni nana kalemua?" also, "Come then, Poro-wauru-ni-mae, you see her a girl for your son?"

Oto e 'alamira uri, "Mai keni taane, ta'a mai keni easi qaike loloto Then he answers them thus, "Girls certainly, but girls not bathe

ni, *ne nau lalawa!* moro taria paro 'iola i'esi, kaele laelae." those, so I unwilling! you two push out canoes to sea, us let begone."

Oto kira a lae wau i dau lo'u i (13) Su'u moli, oto kira asi ha'i Then they go on and lie to also at Su'u moli, and they then again uhia lo'u ahuri ana Kalenipaewa; oto kira rono kira a ha'i soi lo'u blew also conch in Kalenipaewa; then they heard they again ask also uri, "Lae ha e lae mai isiena atei, ohe siena a 'E'ewaa?" Oto thus, "Party it come here to whom, haply to 'E'ewaa?" Then kira a taurini, "E lae mai siena, na kira a rono keni they speak thus, "It comes here to him, and they are enquiring for wife nana a Poro-wauru-i'esi!" "Hoe o lolosia na keni mala a for him Poro-wauru-i'esi!" "Come then, you see her a girl like Poro-wauru-i'esi?" Oto e ha'i 'alamira lo'u uri, "Mai keni taane, Poro-wauru-i'esi?" Then he again answered them also thus, "Girls certainly, wa ta'a mai keni easi qaike loloto! moro taria paro mai 'iola i'esi, but girls not bathe! you two push out the canoes to sea, kaele laelae!" Oto kira ha'i lae lo'u weu i dau ana na maalitawa us let begone!" Then they again go also on and lie to in the opening

(14) i Elemaosi, oto kira a uhia ahuri ana a 'Asilolia, oto kira rono at Elemaosi, then they blow conch in 'Asilolia, and they heard kira a ruru mei, oto kira a taurini, "Olo'olona e lae mai they assembled hither, then they speak thus, "Party it come here isiena atei, ohe siena Poro-teona-i'esi?" Oto kira lae mai isiena to whom, haply to Poro-teona-i'esi?" And they come hither to him na a Poro-wauru-ni-mae ne ea rono keni nana a kalena. Oto and Poro-wauru-ni-mae he he enquires for wife for him his son. Then kira a taurini, "o lolosia na keni, Poro-wauru-ni-mae, nana a they speak thus, "you see her a girl, Poro-wauru-ni-mae, for him kalemu?" Oto e 'alamira uri, "Mai keni taane, wa ta'a hanua your son?" Then he answered them thus, "Girls certainly, but place ni masi otoni! moro taria paro 'iola i'esi, kaele laelae!" Oto for adultery that! you two push out canoes to sea, us let begone!" Then kira ha'i lae lo'u mei dau i (15) Su'u i Uwo, oto kira a uhia they again go also hither lay to at Su'u i Uwo, then they blow lo'u na ahuri ana 'iola satana Maramarao'orou; oto kira ruru again the conch in canoe its name Maramarao'orou; then they assembled mei, kira a soi uri, "Lae ha e lae mai siena atei, ohe a hither, they ask thus, "Party it come hither to whom, haply to Maraupulu?" "Ea lae mai isiena na kira a rono keni nana Maraupulu?" "It comes here to him and they are enquiring for wife for him a Poro-wauru-i'esi!" Oto kira taurini, "Hoe o lolosia na keni Poro-wauru-i'esi!" Then they speak thus, "Come then, you see her a girl

-nana a Poro-wauru-i'esi ilehuna?" Oto ea 'alamira uri, "Mai keni
for him Poro-wauru-i'esi there?" Then he answers them thus, "Girls
taane, wa ta'a mai mane ana hanuani easi totola dona ni mei ni
certainly, but men of place that carrying pair of bags
ne! moro taria paro 'iola i'esi, kaele laelae." Oto kira asi lae
that! you two push out canoes to sea, us let begone." And they then go
wai dau i kaona su'u i (16) Diei. Oto kira rono kira a ruru
and lie to at bottom landing at Diei. Then they heard they assembled
mei. Oto kira a soi heri lo'u uri, "Laeha ni e lae mai
hither. Then they ask question again thus, "Party that it comes hither
isiena atei, ohe e lae mai isiena a Poro-laeno?" "Ea lae
to whom, haply it comes hither to Poro-laengo?" "It comes
mai isiena a Porolaeno, na a Poro-wauru-ni-mae ea rono keni
hither to Porolaengo, and Poro-wauru-ni-mae he is enquiring for wife
nana a kalena." Oto kira a taurini, "Hoe, o lolosia na keni
for him his son." Then they speak thus, "Come now, you see her a girl
mala a kalemua?" "Mai keni taane, wa ta'a hanua ana nau
like your son?" "Girl certainly, but a place for eating
aropuna! moro taria paro 'iola i'esi, kaele laelae." Oto kira lae
snails! you two push out canoes to sea, us let begone." Then they come
mai i dau i kaona (17) Su'upeina, kira asi uhia ahuri ana a
hither and lie to at its bottom Su'upeina, they then blew conch in
Diohimalau; oto kira ruru mei, oto kira a soi lo'u uri, "Na
Diohimalau; then they assembled hither, and they ask again thus "A
laeha e lae mai isiena atei, isiena a Poro-pare-uwo?" Oto kira a
party it comes here to whom, to Poro-pare-uwo?" And they
taurini, "Hoe o lolosia na keni mala a kalemua, laa, Poro-
speak thus, "Come then, you see her a girl like your son, I say, Poro-
wauru-ni-mae?" Oto e 'alamira uri, "Mai keni taane, wa ta'a
wauru-ni-mae?" Then he answers them thus, "Girls certainly, but
mai keni easi qale walawalaa marea ni ne! moro taria paro mai
girls not talk brightly that! you two push out the
iola i'esi, kaele lihulihu." Oto kira lae wai dau i (18) Su'u-toli-
canoes to sea, us let be going." Then they come hither lie to at Su'u-toli-
ato, oto kira uhia ahuri ana 'iola satana a Kale-ni-paewa, oto
ato, then they blew it conch in canoe its name Kale-ni-paewa, then
kira rono ne kira ruru mei, oto kira a ha'i soi lo'u, "Laeha
they heard that they assembled hither, then they again ask also, "Party
ea lae isiena atei neni, ohe a U'umae-hi-oa?" "Ea lae isiena,
it comes to whom that, haply to U'umae-hi-oa?" "It comes to him,
na kira a rono keni nana a Poro-wauru-i'esi." Oto kira
and they are enquiring for wife for him Poro-wauru-i'esi." Then they

tauri, "Hoe, o lolosia na keni mala a kalemu, Poro-wauru-speak thus, "Come then, you see her a girl like your son, Poro-wauru-ni-mae?" "Mai keni taane, wa ta'a kira si mani hele ailiapaa ani ne! ni-mae?" "Girls certainly, but they all grasp staves withal that! moro taria paro 'iola i'esi, kaele laelae." Oto kira lae wai you two push out the canoes to sea, us let begone." Then they come and dau ana maalitawa satana i (19) Talautaha, oto kira rono kira lie to in opening its name Talautaha, then they heard they ruru mei e urihana uuna one. Oto kira a taurini, "Laeha assembled hither it as if particles of sand. Then they speak thus, "Party ohe e lae isiena ro mane neni, a Qae na a Qaepulu-werewere?" haply it comes to two men that, Pwae and Pwaepulu-werewere?" "Ea lae isiena ro mane, na kira a rono keni nana a Poro-It comes to two men, and they are enquiring for wife for him Poro-wauru-i'esi." Oto kira a tauri, "Hoe, o lolosia na keni mala wauru-i'esi." Then they say thus, "Well then, you see her a girl like a kalemu?" "Mai keni taane, wa ta'a mai keni ana karo siriuna (19a)! your son?" "Girls certainly, but girls for digging out cockle shells! moro taria paro 'iola i'esi, kaele laelae ka'u! kaelu asi lae you two push out canoes to sea, us let begone! we are going oto wau i liolio ha'iliu i hanua ikarai." Oto kira asi lae wai on to look about in place of us two." Then they then go and dau i su'u Eda, oto kira a uhia ahuri ana a Ahenai-amau, oto lie to at su'u Eda, then they blew conch in Ahenai-amau, then kira ruru mei, oto e lae wai lio haaroia a Hu'a-pua-kere-manu they assembled hither, then he went and sees discovers Hu'a-pua-kere-manu kalena a Rapupeina, "Hoe, na keni mala Poro-wauru-i'esi, neia his daughter Rapupeina, "Marry, a girl like Poro-wauru-i'esi, she otoni. O lae kau weu i unu siena a Rapupeina." Oto e tetea that You go on to tell to him Rapupeina." Then he drew out wau na lima tahana ni haa, e tetea wau na ro i'a five fathoms of money, he drew out two porpoise teeth paina, "So, haa malisina a kalemu," oto kira a lae i Su'u large, "Here, money befitting your daughter," then they go to Su'u i Arona. "E olu haudina ea liu, haina molu lae paro." Rapupeina i Arona. "Three days it passes, fourth you go there." Rapupeina e ha'arono walu tala ni tolo, ana i Pala wa i Menu-toutou, na he summoned eight paths of hills, at Pala and Manu-toutou, and i Asu Ana, na i Menu Maradili, na i Korerau, na i Rohoroho, na Asu Ana, and Manu Maradili, and Korerau, and Rohoroho, and i Haleha'u, na i Polana, na i Melutei Apalolo, na i Nali Pare; Haleha'u, and Polana, and Malutei Apalolo, and Ngali Pare;

oto kira siho ione i Su'u Eda, kira a lae oto i Su'u Arona,
 then they descended to beach at Su'u Eda, they go to Su'u Arona,
 kira a lai (20) loosi haa. Kira loosia haa oto, e ta'e ro ito
 they go to see money. They see it the money only two bunches
 ni haa kira hunesii. Oto kira nau piina na kara na
 of money they displayed. Then they eat yam soup and yam puddings and
 ha'apoe na. "Moro anai eliho'i lo'u, 'olu haudina ea liu, haina
 mash and. "You two are to return again, three days it passes, fourth
 molu lae paro." Haina kira asi lae, kira ha'arono walu tala ni tolo
 you go there." Fourth they then go, they summon eight paths of hills
 i hahoda. "Kara anai lae oto ana haina." E dani mola na
 above them. "We two shall go on fourth." It light just and
 koro lae oto i Su'u Eda. Kira lae wau kira asi (21) hunesia na
 they two went to Su'u Eda. They went they then displayed a
 rua awala ni haa mana ono, oto kira a aliho'i kira a ere munira
 two tens of money and six, then they returned they bade then
 lo'u muni (22) tola poo; "E olu haudina e liu lo'u, haina molu lae
 also to carry pigs; "Three days it passes also, fourth you go
 paro." Oto haina kira a lae. Kira lae wau na ta'e lima poo kira
 there." Then fourth they go. They went and only five pigs they
 tola; kira lae oto i Su'u Arona siena a Poro-wauru-ni-mae na
 carried; they went to Su'u Arona to Poro-wauru-ni-mae and
 hu'a ineia Hu'a-rahesi-ei, tola poo adarui. Kira lae wai ta na
 wife his Hu'a-rahesi-ei, carry pigs for them two. They went and go a
 ro awala ni haa kira derei ilemina hu'a ro haa, e olu ile
 two tens of money they threw them on her wife two moneys, three ones
 ilemina na poo, e lima ile ilemina na poo, e hai ile; kira nau
 on it a pig, five ones on it a pig, four ones; they ate
 oto kira a hunui oto kira a hahii, i haahulee kira nau mano.
 they killed them, they roasted them, in morning they ate finished.

(1) *rono kenina*. Composite noun, "negotiating a marriage"; *rono*=hear, *keni*=girl, *na*, noun suffix. A man or woman will go with a party to enquire whether the parents of a certain girl will consent to her betrothal to a certain boy. If successful, a certain amount of money, *haa i mei* "money in the bag" is displayed then and there, *hunesia*, hung on a pole. Poro-wauru-ni-mae hung up five strings, each a fathom long, and two big porpoise teeth.

(2) *Su'u i Eda, Dai*, these places are not inhabited now, but there are people at *Arona*. There are no people now on the hills above these places.

(3) *Hu'atea*, name of a dangerous rock off South Cape of Ulawa. *Raa, E Holaa*, two big rocks on shore on west coast.

(4) *Ahi'a* (i.e., Eugenia, Malay Apple), name of a village on west coast of Ulawa, three miles north of South Cape. The name mentioned in each case to whom the expedition is supposed by the people to have come is the name of the tutelary ghost of the *Su'u* or *Maali'ava*.

(5) *Walu*, eight, used for indefinite numbers.

- (6) *Mwarada*, a village one and a half miles north of 'Ahi'a.
- (7) *Oha*, half a mile beyond Mwarada ; there are no people there now.
- (8) *Lenga*, a village two miles north of Mwarada.
- (9) *Hasimo*, a mile north of Lenga ; no people there now. Ripoo village and *Maudia* landing, next to *Hasimo*, is not mentioned in this itinerary ; probably the Ripoo people would go to Hasimo or Taluhi'a.
- (10) *Taluhia*, a mile and a half beyond Hasimo. The people are now all at Mwadoa, a mile further on.
- (11) *Wala-ani-nimo*, a rocky point a mile north of Taluhi'a, the people of Mwadoa would come down there.
- (12) *Aringa-manu*, north-west point of Ulawa ; the village of *Haraina* is a mile up inland, and its position gave point to the statement that the girls did not bathe !
- (13) *Su'u moli*, two and a half miles east of Aringa-manu, in the bay that looks north-west. Doubtless here, too, the people lived on the hills ; there is no one there now.
- (14) *Elemaosi*, the entrance in the shore reef for village of Ngorangora, on the north end of Ulawa, two miles from Su'u Moti.
- (15) *Su'u i Uwo*, three miles south of Ngorangora, on the east coast, in the bay called 'Olu Su'u. There are no people there now.
- (16) *Diei*, two miles south of 'olu Su'u, and the landing for the village of *Mouta*. *Nau aropuna*, composite noun, *nau*, eat, *aropu*, snail, *na*, noun suffix.
- (17) *Su'upeina*, half a mile south of *Diei*, the landing for the village of *Su'uholo*. The comment on the Su'uholo women is decidedly sarcastic, for their speech is particularly lively.
- (18) *Su'u-toli-ato*, two miles south of *Su'u peina*, the people of *O'u* would come down there. There is nobody there now.
- (19) *Talautaha*, the landing in the harbour of *Lopo*, two miles south of *Su'u-toli-ato*. There is no one there now.
- (19a) *siri'u*, a bivalve used for scraping the charred outside of yams during roasting on embers.
- (20) After the paying of the betrothal money, the next step was to summon all the people to the bridegroom's place to see the purchase money, *loosi haa* ; this is only done for great weddings ; the visitors would be fed.
- (21) Then the bridegroom's people take the purchase money to the bride's people, and display them, and make speeches, and are fed.
- (22) Finally, the bridegroom's people go to the bride's place and get her. The bride's father has provided pigs, and these are carried to the bridegroom's place, the bride accompanying them. The purchase money seems to have been taken also in this case, twenty were given to the bride as a dowry, and others were laid on the pigs to show that everything was equalized, and that each pig was paid for. In an ordinary wedding the processes were simplified.

Marriage Negotiations.

When they had ceased hostilities they set about negotiating the marriage of Poro-wauru-i'esi. Then they began to hire canoes, and they began by hiring two canoes at Su'u Eda ; their names were Ahinai-amau and Maramara-o'orou. Then they hired also 'Asilolia a canoe belonging to Dai, and two canoes called Diohimalau and Kalenipaewa. Then they embarked on the five canoes they fetched a compass by sea over by Hu'atea ; and there was no way open for them, since the waves forbade their passage there. Then a person called Poro-wauna-ahe broke the waves with magic, then when they had gone past the waves came up again and closed the way behind them. Then they came to the two rocks called Sunlight and Calm ; and they went on round by sea as far as the opening of the landing,

at 'Ahi'a; and they lay-to and blew the conch in the canoe called Diohimalau, and the sound of the conch penetrated all the districts in the hills above. When they heard it they hurried down to the beach; then they asked saying, "To whom has this party come? to Sau-lada-hunu"? And they said, "No"! Then said they, "Have you not heard that they are looking for a wife for Poro-wauru-i'esi"? And they were all gathered together on the landing at 'Ahi'a. Then the men produced the girls and said, "Well then, can you see a girl that is the mate of Poro-wauru-i'esi"? Then Poro-wauru-ni-mae says, "There are plenty of girls on the beach, but what girls they are for huge fires!" then says he, "Push the canoes out to sea, let us be going." Then they went on again and lay-to at Mwarada landing, then they blew the conch again, and it penetrated all the districts on the hills. And when they heard it they asked, "To whom has the party come? to Horaio peina"? And they said, "No, where has it come to him? they are looking for a wife for Poro-wauru-i'esi." They were massed at the foot of Mwarada landing; then they said, "Well then, can you see a girl fit for Poro-wauru-i'esa"? Then Poro-wauru-ni-mae says, "There are plenty girls here but what girls they are for getting *amau*!" They failed to find one; then he says, "Push the canoes out to sea, let us be going." Then they went on again and lay-to at the landing at Oha, then they blew the conch again and the people on land asked again, "To whom has the party come? To the four Ngeresau"? And they said, "No, have you not heard that they are looking for a wife for Poro-wauru-i'esi"? Then said they again, "Can you see any girl, Poro-wauru-ni-mae"? Then says he, "There are plenty of girls here, but what girls they are for stopping in their bed-chambers." Then he says, "Push the canoes out to sea, let us be going." Then they went and lay-to at the foot of the landing at Lenga, and they blew the conch in the canoe called 'Asilolia, and when they heard it they were massed on the landing like the sand. Then the people of the place asked saying, "To whom has the party come? to Poro-ahu-tao"? And they said, "No, did you not know that they are looking for a wife for Poro-wauru-i'esi"? And they said, "Well then, can you see a wife for your son, Poro-wauru-ni-mae"? Then he answers them and says, "There are plenty of girls here, but what lanky girls they are! Push the canoes out to sea, let us be off again." Then they went on again and lay-to at Hasimo landing, and they blew the conch again, and when they heard it they asked again, "To whom has the party come? To the four Saumaemae"? And they said again, "They have come to them (have they?) and they are looking for a wife for Poro-wauru-i'esi, have you not yet discovered that"? Then they said, "Well then, can you see a wife for your son, Poro-wauru-ni-mae"? And he answers them again, "There are plenty of girls here, but what girls they are for starving people! Just push the canoes out to sea, let us be off." Then they went on again and lay-to at the foot of Taluhia landing, they blew the conch again in the canoe called Maramara-o'orou, and when they heard it they were massed on the beach like the sand. Then the people of the place asked again, "To whom has the party come? To Rohō-i-mae"? And they said, "Well then, Poro-wauru-ni-mae,

can you see a wife for your son?" Then he answers them again and says, "There are plenty of girls here, but what girls they are for talking! Push the canoes out to sea, let us be gone." And they went and lay-to at Wala-ani-nimo, and they blew the conch in the canoe called Ahinai-amau, and when they heard it they were massed like the sand. Then the people of the place asked again saying, "To whom has the party come? haply to Sau-hurei-menu?" "They have come to him (have they?) and have you not discovered that they are looking for a wife for Poro-wauru-i'esi?" And they say, "Well then, can you see a wife for Poro-wauru-i'esi?" And he answered them again and said, "There are plenty of girls here, but what girls they are for begging and questioning! Push the canoes out to sea, let us be going." Then they rounded the point, they went and lay-to at Aringa manu, and they blew the conch there also, and when they heard it they were massed like the particles of sand. And the people of the place asked also again, saying, "To whom has the party come? To Ha'iparo?" And they said, "It has come to him (has it?) and they are looking for a wife for Poro-wauru-i'esi." And they say again, "Well then, Poro-wauru-ni-mae, can you see a wife for your son?" And he answered them and said, "There are plenty of girls here, but what girls they are for not bathing! so I'm unwilling." And then they went on and lay-to at Moli landing, and they again blew the conch in Kalenipaewa, and when they heard it they asked again, saying, "To whom has the party come? haply to 'E'ewae?" And they said "It has come to him (has it?) and they are looking for a wife for Poro-wauru-i'esi." "Well now, can you see a girl the mate of Poro-wauru-i'esi?" And then he answered them again saying, "There are plenty of girls here, but what girls they are for not bathing! Push out the canoes to sea, let us be gone." And they went on again and lay-to at the entrance called Elemaosi, and they blew the conch in 'Asilolia, and when they heard it they all assembled, and they said, "To whom has the party come? haply to Poro-teona-i'esi?" Then they came to him and Poro-wauru-ni-mae looks for a wife for his son. And they said, "Can you see a wife, Poro-wauru-ni-mae, for your son?" And he answered them saying, "There are plenty of girls here, but what a place it is for adultery! Push the canoes out to sea, let us be off." And they came on and lay-to off the landing at Uwo, and they blew the conch again in the canoe called Maramara-o'orou; and they were gathered together, and they asked saying, "To whom has the party come? haply to Marau pulu?" "It has come to him (has it?) and they are looking for a wife for Poro-wauru-i'esi." And they said, "Well then, can you see a wife there for Poro-wauru-i'esi?" And he answered them and said, "There are plenty of girls there, but what men they are in this place for carrying pairs of bags! Push out the canoes to sea, let us be gone." And they went and lay-to at the foot of the landing at Diei, and when they heard it they assembled. And they asked again saying, "To whom has the party come? haply it has come to Poro-laengo?" "It has come to Poro-laengo (has it?), and Poro-wauru-ni-mae is looking for a wife for his son." And they said "Well then, can you see a girl the mate of your son?" "There are plenty of girls here, but

what a place it is for eating snails! Push the canoes out to sea, let us be gone." And they came and lay-to at the foot of the big landing place, and they blew the conch in Dihimalau, and they gathered together, and they asked again, saying, "To whom has the party come? to Poro-pare-uwo?" And they say, "Well then, can you see a girl the mate of your son, Poro-wauru-ni-mae?" And he answered them and said, "There are plenty of girls here, but what girls they are for drawling! Push the canoes out to sea, let us to our paddling." And they went and lay-to at Toli-ato landing, and they blew the conch in the canoe called Kale-ni-paewa, and when they heard it they assembled, and they asked again, saying, "To whom has the party come? haply to U'umae-hi-oa?" "It has come to him (has it?) and they are looking for a wife for Poro-wauru-i'esi." And they said, "Well then, can you see a girl the mate of your son, Poro-wauru-ni-mea?" "There are plenty of girls here, but they are all on crutches; push the canoes out to sea, let us be gone." And they went and lay-to at the opening called Talautaha, and when they heard it they were massed like the particles of sand. And they said, "Haply the party has come to the two men, Pwae and Pwaepulu-werewere?" "It has come to the two men (has it?) and they are looking for a wife for Poro-wauru-i'esi." And they say, "Well then, can you see a girl the mate of your son?" "There are plenty of girls here, but what girls they are for digging out cockle shells! Push the canoes out to sea, let us be gone. We shall go and search in our own place." And they went and lay-to at Edo landing, and they blew the conch in Ahenai-amau, and they were assembled. And he went and found Hu'a pua-kere-manu the daughter of Rapupeina, "Marry, a girl the mate of Poro-wauru-i'esi, here she is; go and tell Rapupeina." Then he drew out five fathoms of shell-money, he drew out two large porpoise teeth, "Here, this money is worthy of your daughter." And they went to Arona landing. "After three days are gone, on the fourth day you are to go." Rapupeina summoned all the districts on the hills, at Pala, and at Mani-toutou, and at Asu Ana and Manu Maradili, and at Korerau, and Rohoroho, and Haleha'u, and Polana, and at Malutei Apalolo and at Ngali Pare. And they came down to the beach at Eda landing, to go to Arona landing to see the purchase money. They saw the money, just two bunches of money were displayed. And they fed on yam soup and yam puddings, and taro mash and all. "You must go home; after three days are gone, on the fourth day you are to go." So on the fourth day they went, all the districts on the hills above were summoned: "We shall duly arrive on the fourth day." And soon as it was daylight they went down to the Eda landing. They went and displayed twenty-six shell-moneys; then they went home, and they were bidden to fetch the pigs. "After three days are over, on the fourth you are to go," so on the fourth they go. They went and fetched just five pigs; they went to the Arona landing to Poro-wauru-ni-mae and his wife, Hu'a-rahesi ei, taking their pigs. They went and got twenty shell-moneys and gave them as the bride's portion, two or three moneys they laid on this pig, five on that pig, or four; they had some food and then they killed the pigs, they roasted them, and in the morning they ate them all.

(4) Lau Huana (1).

(4) Wife Theft.

Hu'a-pua-kere-manu esi deudeuma oto ilahona Su'u Arona ilalona
 Hua-pua-kere-manu she then worked above Su'u Arona in it
 wapu, (2) mai rano ni ei kira loosii hula i (3) Kela. A Poro-
 dense forest, the dried of trees they see them as far as Kela. Man
 wauru-i-Kela e aholo esi lio haaroia mai rano ni ei, "Ta'e
 fall down-at-Kela he kite fishing he look discover the dried of trees, "one
 inoni ea dauduma ne ilaho ileni ni! hanueni. uri e ha'atau!
 person she works that above on the hills there! place that is it far off!
 Na'a nai lae kai he'italea muni e lana ka'u nakua." Ineia esi lai
 I will go to seek her to snatch her for mine." He he then went
 unua siena nikenā, "O ha'alia ka'u 'ekui." E hahi, e
 told to her his mother, "You cook please for me." She roasted, she
 ha'apoe e haneia ro donai po'upo'u, e inia na puta ni
 made mash she climbed two couples of green coconuts, she picked a roll of
 oha; "O halia na hunui pua 'akua;" oto e ta sao ineia
 oha; "you break off a bunch of areca nut for me;" then he took leaf kite his
 e ludezia wau mo'ola otona. Alai ulana e walaa munia,
 he stowed it his things to eat on his way. The his brothers speak to him,
 "Oa lai hei oto, oa tola ola huna?" "Na'a lihulihu,
 "You go whither, you carry things many?" "I am journeying by sea
 mo'ola otoku." Oto ea lae. Oto e laelae, oto e
 the things to eat on my way." Then he goes. Then he keeps on going, then he
 laelae, e liutaha ana Mala Paina, e liutaha ana lo'u
 keeps on going, he went out beyond Mwala Big, he went out beyond also
 Mala Haora, oto ea na'ohia Arona, oto ea lai one. Oto e lae
 Mwala Little, then he steers for Arona, then he gets to coast. Then he goes
 wai arapuu i Su'u Arona, oto e lio wau na a Hu'a-pua-kere-
 on and makes land at Su'u Arona, then he looks there and Hua-pua-kere-
 manu ea hodalia nimana i kaona Su'u, oto e na'ohia na
 manu she is washing it her hands at bottom landing, then he steers for her and
 e uriuri atopuri i 'esi. (4) Taa ta'e a Poro-wauru-i-kela e lae sili
 she stood with back to sea. One seat Poro-wauru-i-kela goes enters
 i kaona, oto e lae mai ta'e i na'ona, oto e tolenani
 underneath her, then she comes hither sits at his front, then he rapidly
 haluteineinia e lae wai 'esi. Poro-wauna-ahe e loosi rarua, e
 paddles her he goes out to sea. Poro-wauna-ahe he looks at them two, he
 lolosi ahe parasirerua. E hai haudina koro ma'ahu ana ta'e ele
 bends waves against them two. Four days they two sleep in one little
 lehuni na 'asi e mawa paina parasirerua; oto ea walaa uri,
 place that and sea it storms big against them two; then he speaks thus,

"Tahania ahe, kore laelae, hu'a e sare to'ohana."
 "Make way through waves, let them go, woman she wishes belong to him."

Esi tahania koro si lai Kela. E lae wau oto e
 He then got through it they two then go to Kela. He went there then he

lai konia laona na ahi, ineia e qake sisili taha oto. Oto a
 went and put her in a bedchamber, she she not emerge out. And

nikena e lio haaroia, "E ua oto oasi mumumunia maaniau,
 his mother she looks discovers her "It how you hidden her from me,

(5) ma'a? hu'a kia tolea kia a unua siena nika." Uri e (6)
 child? a wife we take her we tell it to her our mother." Supposing she

masi oto na noonoo ni salo e noa. Amana a Poro-sahu-qaaqaa,
 laughed the end of cloud it broken off. His father Man-lime-gourd-broken,

e hotoia hoi sihu oto e lanu holo na roto e usu wai 'ano.
 he rattled a lime gourd then it broke across a piece it fell down on ground.

Ta'e mai mane oto i one, kira (7) malaohu, oto kira a ta mao i
 Only the men at beach, they malaohu, then they make dance in

henua ni lai henua. Oto kira tau ei oto, kira (8) dou reu muni
 village to go to village. Then they make firewood, they gather leaves to

hehi poo. Oto kira para poo, oto kira uhu niu, kira ha'apoe
 roast pork. Then they enclose pigs, then they husk coconuts, they make mash

e ro haudina kira ha'apoe ana, oluna ni hunu poo, haina ni neu.
 two days they make mash during them, third for kill pigs, fourth for feast.

Oto Poro-wauru-i'esi e lae oto i he'italea hu'a ineia, oto e lae wai
 Then Poro-wauru-i'esi he went to look for wife his, then he went there

siena ro mane, ro okaoka a'ole kira suu maani rerua, ana kira
 to two men, two eat raw flying fish they gone from them two, because they

nau poe ia, kira maesia E lae wai sili siedarua,
 ate poisonous fish, they died of it He went and entered in to them two,

"Ro ele mane, ro uleku, a nikaekaelu e unua ne'e lae mai
 "Two young men, two my brothers, our mother she said it that I come here

isiemoro. Kaelu suluia ka'u wau 'iola mumuni, kaelu lai konia
 to you two. We pick up please away canoe out of sight, we go and put it

ana lehu nihou e ua, lehu e pono." Oto kira lai konia
 in place this how that, a place it overgrown." Then they went and put it

ana. "Ro ele mane, kira nahei i henua ilehu?" "Na hu'a kira
 in it. "Two young men, they who in place here?" "A woman they

luda pelia, ineia i henua ilehu, ta'e hu'a saena e diena, ea
 carried stole her, she in place here, one woman he heart it good, she

niinii 'amerei, merei mere a lae wai neneku i siena."
 gives food to us two, we two we two go there and stay with her."

"Moro anai lai hei si'iri, i maani mao? oto moro ta mai
 "You two will go where to-day, to watch dance? then you two take the

leuni inau, moro launi eni." Na hou pua e ta munirerua ornaments mine, you two adorn with them." A fruit areca he gives to them two maia mai oha maia sahu a hu'eni. Oto koro lai along with the oha along with lime gourd that woman. Then they two went henua koro lae wai siena oto, ea suka adarua "Mai na hou village they two went on to her, she begs from them two "Hither a fruit pua 'akua, ro mane, na na oha," "Mere asi teui ihei?" "ta'a areca my eating, two lads, and an oha," "We two then get them where?" "but moro ta mola mai." Oto koro nii 'ana, na hou pua na na you two give just hither." Then they two give her eating, a fruit areca and a apai oha 'ana. "Atei e ta mo'ola hou, 'amoroi?" "iemerei leaf of oha her eating. "Who he give the things these, to you two?" "we two e ua, laa, mere asi akaauri ihei?" "i'omoro moro na ro it is how, I say, we two then furnished where?" "you two you two the two ola moro qale akaakauri! ta'e mai pua na'asi lo sai persons you two not furnish yourselves! only the areca nuts I then look know hou; mai pua ana na malau hou! Mai leuni atei moro a leuni this; the areca nuts from an island this! The ornaments whose you two adorn eni ni? mo'ola ni e urihana laulaunitana na inoni!" E withal that? the things that it is as if the ornaments of a person!" She tauri, "Ro ele mane, kira anai ha'apoe oto ideni, more says this, "Two young men, they will make mash to-morrow, you two must lae mai i ha'apoe, more tolea wau na masi ha'apoe 'amoroi come here to mash, you two must take away a piece mash for you two 'amolu." Oto koro lai henua, koro lae wau na kira for you three." Then they two went to village, they two went there and they ha'apoe mano oto, oto koro asi tolea wau na masi ha'apoe mashed finished, then they two carried away a piece mash 'ada'elu. Oto a Poro-wauru-i'esi e tauri, "Atei e ha'apoe 'akaelu for them three. Then Poro-wauru-i'esi he says thus, "Who he mashed for us hou?" "laa ni, na hu'a paro hou e nii 'akaelu; kira hunu this?" "I say you, the woman yonder this she gave our eating; they kill poo mala i deni." "Ro ele mane, more lae mai i ma'ahu suuia pigs as to-morrow." "Two little boys, you two come here to sleep round mo'ola ikaelu, inau ne'e lae ka'i henua, ne'e mauru ahu." Oto the things our I I shall go to village, I shall sleep completing." Then e lai henua, e lae wai 'ura laona na (9) paraita (hou ni dili he goes to village, he goes and stands in the enclosure (tree of dracaena ileuna maia na mahe) asi qaaqaarono, na kira a kana there along with a scented shrub) he then listens, and they are oto, na kira a (10) teatea na, esi dere pulu ilenida singing, and they are making speeches and, he then throws gall on them

muni kiri ma'ahu. Oto e lae wai ura ea tea. E
 that they should sleep. Then he goes and stands he makes a speech. He
 teatea mano na hanua e ma'ahu mano, oto kira qake manamanatainia,
 spoke finished and village it slept completely, then they not perceive him,
 ta'e ro areareoa e lio. "Haia, ala mane, a laa ni oto ea walaa
 only two ulcerous men awake. "I say, boys, the person that he speaks
 wa'ewa'e amolu; na laa ni hei ni? molu qake talisi muni
 exceedingly against you; a person from where that; you not awake that
 molu e horoia! Na laa ni Ulawa ea walaa muniomolu, ala
 you should kill him! A person from Ulawa he speaks to you,
 mane." Oto e sili wei (11) toohi meia mata, oto e horo mano
 boys." Then he entered men's house with club, then he kills finished
 laona tohi; oto e lae lo'u i maana tohi, oto e horo
 in men's house; then he went also to front of men's house, then he kills
 mano lo'u i maana tohi; oto e anohia lo'u huu ni kana
 finished also in front of men's house; then he creeps to also group of singers
 oto e horo manoa. "Haia, ala mane inau, atei ea horo wa'ewa'e amolu,
 then he kills it all. "I say, boys mine, who he kills exceedingly you,
 apu oto e ahesia, hanua oto e suu." Na tanalau e horoia, esi
 blood it flowed over, place is depopulated." A hundred he kills, he then
 ta muni lai keru ana na hunui pua, "So, hunui
 made to go and take hold of a bunch of areca nut, "Here, a bunch of
 pua i'oe, Poro-wauru-i-kela," esi lai soia hu'a, "Silitaha mai,
 areca nut thine, Poro-wauru-i-kela," he then went calls woman, "Emerge hither,
 kare laelae; mai taha i nimeni?" na ro poo na'a hahii i
 let us two go; the what in house that?" two pigs I am roasting them in
 nimeni," "hu'esia mai na ro roto, kare totolei; mai taha
 house that," "take out hither two pieces, let us two carry them; the what
 ilehuna, na mai haa?" "Mai haa hou," "konii laona na ana," "kira
 there the moneys?" "The money this," "put them in it a bag," "they
 asi tauritaha ani, atei anai tolei hou?" "Inau, ioe oa tolea
 do what to withal, who will carry them these?" "I, you you carry it
 mai poo, inau na'a tolea mai haa." Oto koro lai one,
 the pork, I I will carry it the money." Then they two went to beach,
 "Hoe, tetea na roto ni poo 'adarua; hoe, moro sulu
 "Come then, take out a piece of pork for them two; come then, you two carry
 mai i 'esi;" oto koro lae wai ta'e, oto koro a lae mai
 hither to sea;" then they two go and embark, then they two come hither
 i 'esi, na Poro-wauna-ahe ea huru meia 'iola ilaona mawa. Koro
 to sea, and Poro-wauna-ahe he hastens with it canoe in storm. They two
 lae mai liua i Mala Paina, koro liua i Mala Haora, koro
 come hither pass by Mala Big, they two pass by Mala Little, they two

toli 'iola ana Arona, koro lae mai i arapuu i Su'u Arona,
 set canoe at Arona, they two come hither make land at Su'u Arona,
 na hanua kira ha'apua i purina, kira unua e mae oto, hule
 and place they make taboo after him, they thought he dead, convolvulus
 e aa hahia taoha. Poro-Holosia esi (12) kukaoe, oto Poro-
 it grew over over men's house. Poro-Holosia he first raised the cry, then Poro-
 wauru-ni-mae easi huru wei one, "Atei e qake roronoau, ana nau
 wauru-ni-mae he then runs to beach, "Who he not hear me, when I
 ha'apu i purina kaleku?" "Inau nau kukaoe, osi lio ka'u
 made taboo after him my son?" "I I raised the cry, you then look please
 wai su'u, atei na atei ro inoni ikoro koro a lae wau?"
 in landing, who and who two people they two they two go yonder?
 Koro lae wai sulu ileni, koro lae wai nima ikoro; kira
 They two go and lift up on land, they two go to house they two; they
 tatalia masi poo, ha'adora mai maa.
 cut up piece pork, distributing to the doors.

(1) *Lau hu'ana*. Composite noun, wife snatching, *lau* snatch, *hu'a* wife *na*, noun suffix.

(2) *rane ni ei*, dead trees, the bigger trees in a yam garden are left, the fire is made at their base to kill them.

(3) *Kela*, south-east end of Guadalcanar, 60 miles off.

(4) *Taa ta'e*, "one embark," i.e., canoe to hold one man, but a second person is frequently taken.

(5) *ma'a*, "father," Vocative, used hypokoristically for "son."

(6) *masi*, her name was "*Hua masi i salo*," woman laugh in sky.

(7) *malaohu*, men and boys living apart on beach pending the catching of bonito. When all preparation were finished and bonito were caught then the men returned to the village with a dance, and the initiated *ha'amalaohu* gave a feast through their relatives.

(8) *dou reu*, the food is wrapped up in the ginger leaves or in the leaves of the large creepers and then put in the ovens.

(9) *paraita*, the sacred enclosure outside the house, planted with red dracaena and strong smelling herbs. The areca nut skins were thrown into it for safety to prevent them being used in witchcraft.

(10) *teatea*, the man making a speech held a spear and made several short runs of a few paces, and as he turned each time he uttered a loud shout, *hoe!* following it up with a few words, and then running back again and shouting.

(11) *toohi*, men's club house in the village; *taoha*, canoe house on beach also sacred to men. The *toohi* had a platform in front and men slept there.

(12) *kukaoe*, the cry raised when a shoal of bonito is seen, or a strange canoe. Not the same as "cooe" which has been altered to *kuukuu* in Ulawa.

The Theft of the Bride.

Hua-pua-kere-manu began to work at the yam gardens there above the Arona landing right in the thick bush; the dead trees could be seen as far as Kela. Poro-wauru-i-kela was kite-fishing and saw the dead trees, "What a person for work that is there up above! That place is no distance off! And I must go and try and snatch her for myself." He then went and said to his mother "Cook me

some food in the oven, please." She roasted, she prepared taro mash, she climbed and got two couples of green coconuts, she picked a roll of *oha* leaves. "Break off a bunch of areca nuts for me." Then he got his fish-kite and ladened his canoe with the food for his journey. His brothers said to him, "Where are you going to with so much stuff as that?" "I am going to sea. This is my food for the journey," and so he went. And he went on and on, he passed Big Mwala, he passed Little Mwala also, then he made for Arona, and he gets to the coast. He made the land at Arona landing, and he looks and Hua-pua-kere-manu was washing her hands at the foot of the landing, and he steered for her, and she was standing with her back towards the sea. The canoe of Poro-wauru-i-kela went right underneath her, and she sat in front of him; then he immediately paddled off with her and went out to sea. Poro-wauna-ahe saw them, and stopped their escape with breakers. They two slept four nights in that tiny spot and the rough sea kept them prisoners; then he spoke and said, "Make your way through the breakers, let them go; the woman wants to stay with him." He made his way through and they went off to Kela. When he got there he put her in the inner chamber, she came no more out. Then his mother found her. "Why have you hidden her from me, my son? When we take a wife we inform our mothers." Did she but laugh, a piece of the sky broke off! His father was He-of-the-broken-gourd, he was rattling his lime gourd and it broke across and half of it fell on the ground. Now the men were diving down on the beach, they were initiating the boys, and they made a dance in order to return to the village. And they broke firewood, and gathered leaves for the roasting of the pork. And they put the pigs in the enclosure, and they husked the coconuts, they made taro mash, they were two days making it; the third day was for killing the pigs, the fourth for the feast. And Poro-wauru-i'esi went to find his wife, and he went to the two men, the two who ate flying fish raw; their relations were all dead, because they had eaten a poisonous fish and had died of it. He went into their place, "Lads, my brothers, our mother said that I was to come to you? Help me carry up my canoe out of sight; let us put it here forsooth in this thicket;" and there they put it. "Lads, what people are there in this place?" "A woman whom they stole, she is in here; what a kind woman she is! She feeds us two, we go and visit her." "Where are you two going to-day, to watch the dance? You take my ornaments and wear them." He gave them an areca nut and some *oha* leaves together with his wife's lime gourd. And they went to the village and went to her house; she begs from them, "Give me an areca nut, lads, and an *oha* leaf." "Where are we likely to get any?" "Nay, just give me them." So they give her them, an areca nut and a leaf of *oha*. "Who gave you these things?" "Why we got them ourselves, who should provide us with them?" "You two are not the ones to go and provide for yourselves! Nay, I recognize these areca nuts, these are nuts from an island! Whose ornaments are those you two are wearing? They look as if they were someone's ornaments!" She said, "Lads, they are to pound taro mash to-morrow, you come and help pound it, and take away some

mash for your two selves, for you all." And so they went to the village; when they arrived the mash was all pounded, and they just took some mash for all of them. Then Poro-wauru-i'esi said, "Who was it pounded this mash for us? It was the woman over here who gave it to us; to-morrow they kill the pigs." "Lads, you come and sleep and watch over our things, I am going up into the village. I shall stop and sleep there." Then he went to the village, and went and stood in the sacred enclosure (there are dracaenas there and strong smelling herbs) and listened, and they were singing, and they were declaiming and all, and he threw gall on them to make them sleep. Then he went and stood up and began to declaim. When he had finished his speech the whole village was asleep, and they were ignorant of his presence; two cripples were the only people awake. "I say, boys! this fellow's words are very severe on you. Where has he come from? Why don't you wake up and kill him! This is a fellow from Ulawa who is talking to you, boys." Then he entered into the men's house carrying a club, and he killed all those who were there; then he went on to the platform in front, and he killed all those also who were on the platform; then he crept up to the singers and killed them all. "I say, my lads, who is this that is doing you all to death, the blood is running freely, the people are all dead?" He killed a hundred and then went and grasped hold of a bunch of areca nuts. "Here is your bunch of areca nuts, Poro-wauru-i-kela." Then he went and summoned his wife, "Come outside, let us be going; what have you in the house?" "Two pigs I am roasting here in the house." "Take out two pieces of pork; let us take them. What have you in there, any money?" "There is money here." "Put it in a bag." "What is to be done with it, who will carry it?" "I will; you carry the pork, I will take the money." And they went to the beach. "Take out a piece of pork for the two of them; now then, you put the canoe in the sea." Then they embarked and they put out to sea, and Poro-wauna-ahe raced with the canoe in the storm. They passed Big Mwala, they passed Little Mwala, they steered for Arona, they made land at Arona landing. They had put the village under tapu after he went, thinking he was dead, and the convolvulus was growing over the men's house. Poro Holosia raised the first cry, and Poro-wauru-ni-mae hastened to the beach "Who is he that did not hear me when I placed the taboo after my son went? It was I raised the cry, just look down there at the landing; who is that man and woman making over there?" They carried their canoe up on shore, and went into their house; the pork was cut up, a piece for each house.

ABORIGINAL ROCK CARVINGS OF GREAT ANTIQUITY IN SOUTH AUSTRALIA.

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[WITH PLATES I-XVII.]

Introduction.

DURING a geological reconnaissance of the Yudanamutana district on behalf of the South Australian Government, in 1906, I first came into contact with the relics of the unique type of aboriginal art about to be described in this paper. I read a brief notice on the discovery before the Anthropological Society of Berlin in 1907. The importance of the find induced me to revisit the above-named district, shortly after my return to Australia, during the latter part of 1910. The results of this second visit were so highly satisfactory that a third visit seemed desirable, and this was undertaken in the beginning of the following year. During my second and third visits to the northern Flinders Ranges, it was my good fortune to record three additional localities where similar rock-markings occur, ranging from thirty to sixty miles in distance from the site of the original discovery. More recently still, I was able to add two further discoveries to the above list, from entirely different localities, making a grand total of seven separate occurrences. Although identical in technique with the original, two of the newer finds by far surpass it as regards number and detail of designs, and the care with which the figures have been cut into the rock. They present, moreover, many new and interesting forms for study.

Perhaps it may yet be proved that these ancient aboriginal carvings are not so rare as I was at first inclined to believe.¹ Among the residents in the several

¹ Since the above was written, I have made additional enquiries concerning these ancient relics of primitive art, and have obtained some information which confirms this view. (i) Mr. J. R. B. Love tells me that there were some emu- and dog-tracks on a flat rock below the old Myrtle Station (near Leigh's Creek). A visitor intended removing the rock to Adelaide, whereupon the local blacks destroyed it. (ii) Mr. Love also found some carvings near Top Well, 4 miles east of Leigh's Creek. They are in two groups, about 100 and 200 yards respectively from the well. They are of the same character, but not so numerous, as those of the Deception Creek series: chiefly emu-, wallaby-, and kangaroo tracks, and rough circles. They are exceedingly weatherworn. (iii) At Euro Tank, a natural water-hole, on Poolamacca Station in the Euriovie District, some 56 miles north of Broken Hill (New South Wales), a similar series of carvings may be seen upon the rocks in very rough country. They consist chiefly of emus, wallabies, lizards, and corroboree-designs. (iv) It is of interest to note that among some relics of the ill-fated Bourke and Wills Expedition (1860-61) in the

districts visited, the impression was generally that the curious forms on the weather-beaten faces of the rocks represented the fossil-imprints of strange, prehistoric monsters. It seems a remarkable fact that no description has been placed on record of so interesting and important a type of primitive aboriginal art in Australia.

My first impression and opinion as to the age of these productions have been strengthened in every respect. They appear to me to afford us a clue to the antiquity of man in the southern Island Continent.

Localities.

The original discovery was made at two native waters called Balparana and Wilkindinna. The former is situate in the bed of a creek of similar name, which, in flood time, flows into the Frome River. The water, which is in the form of a "soakage well," is distant 38 miles from Leigh's Creek,¹ in direction N. 53° E. Wilkindinna lies east by south of Balparana, about 9 miles, in the dry course of Taylor's Creek. From Leigh's Creek it is 43 miles, in direction N. 62° E. A series of rockholes containing water occurs at the site. The Frome and Taylor's Creek both flow northwards into the Lake Eyre basin.

Two of the more recent discoveries were made along the course of Deception Creek, about 8 miles north-east from its junction with Windy Creek. The site is locally known by the expressive name of "Red Gorge," all the steep rock faces of the channel cut by the creek being superficially coloured a deep rusty-red, as is described more fully below (page 199). There are two distinct series of carvings at this spot within a mile of one another. From Leigh's Creek the distance is 12 miles in direction E. 9° S.; from Wilkindinna 32 miles south-westerly. Below the confluence of Deception and Windy Creeks, the water-course, which is thickly lined with gum trees (*Eucalyptus rostrata*), trends westerly, and is known as Depôt Creek, or Scott's River. It is part of the drainage system that empties itself into the Lake Torrens basin.

The remaining find in this district is in the bed of the Oratunga Creek, a few chains west-north-west of the "Third Springs." It is 34 miles in direction S. 18° E. from Leigh's Creek, and 31 miles southerly from the Deception Creek occurrence.

The next record to be noted is at Yunta Springs, a permanent water situated about 5 miles north, and slightly west, of the railway station of similar name. From Leigh's Creek it is 150 miles in direction S. 25° E.

Lastly, a limited number of similar carvings was examined at "The Springs," four miles east-north-east of Mallett, and about 20 miles east-south-east of Yarcowie. This site is distant 195 miles from Leigh's Creek in direction S. 14° E.

Albemarle Hotel, Menindie, N.S.W., a few stone implements bear a limited number of similar carvings. (v) Mr. W. A. Ferguson remembers seeing some emu-tracks carved into the rocks at a natural water in the Carrieton District, east of Port Augusta.

¹ Long. 138° 25' 30" E., lat. 30° 33' 0" S.

Geological Formations.

The northern portions of the Flinders Ranges, in the districts here considered, consist of a complicated series of Pre-Cambrian and Cambrian beds. The former constitute the core of the ranges and are composed of crystalline rocks, quartzites, and phyllites, extensively intruded on the east by igneous rocks. The Cambrians form the western flanks of the range as the uppermost members of an anticlinal fold. They consist chiefly of subcrystalline limestones and calcareous sandstones. The beds are in parts richly fossiliferous, containing numerous forms of the interesting class Archæocyathinae. The general trend of the country is north-easterly, the strike of the Cambrian beds more northerly and east of north. The dip is usually easterly, but is variable to horizontal. Where horizontal, the characteristic table-hill weathering has resulted (Red Gorge). The carvings occur on the faces of rocks belonging to the latter series. At Balparana and Oratunga Creek they are upon clay slate and calcareous shale; at Wilkindinna principally on conglomerate, mudstone, and clay slate; and at Deception Creek on compact, blue, subcrystalline limestone, with a conspicuous conchoidal fracture (*vide*, for example, Plates VI, B, VIII, B, IX, B). At the "springs" near Yunta and Mallett respectively, the formations consist of laminated arenaceous limestone and calcareous clay slate.

The natural rock-faces selected are either those of bedding, shearing, or jointing; the carvings on the last named have resisted the denuding action of the atmosphere least when the shear, or bedding, planes have been cut by the joint-plane at an angle.

Technique of Designs.

The designs composing this extinct type of Australian aboriginal art have been chipped into the rock-faces in a manner that has not hitherto been recorded from Central Australia, nor has indeed an identical type been described from any part of the Australian continent. They are quite distinct, and differ from the familiar rock-carvings of Port Jackson and its vicinity,¹ where the outlines were cut or grooved into the local Triassic sandstone with a sharp rock fragment. A closer analogy may perhaps be traced with the intaglio of a human face cut in profile in sandstone, discovered by Sir George Grey² on the Glenelg River in North-West Australia.

I have already described "rock scratchings" on the faces of diorite-outcrops in the Mann Ranges, discovered on the Government N.-W. Expedition of 1903.³ In that instance a sharp fragment held in the hand had been used to scrape or

¹ For a detailed description of these carvings see W. D. Campbell, *Memoir Geol. Survey N.S.W., Ethnolog. Series, No. 1*, 1899.

² *Journals of Two Expeditions of Discovery in the North-West and Western Australia*, London, 1841, vol. 1, p. 205.

³ *Vide Trans. Royal Society S. Aust.*, 1904, vol. xxviii, pp. 38 et 39, Plate XI.

scratch the designs into the rock. They consisted chiefly of circles and tracks that were produced by a mere abrasion of the rock surface.

In the cases now under consideration we are dealing, to all appearances, with a decidedly more advanced type of rock markings, which indeed may be regarded as primitive gravures. The designs have all been intagliated to a variable depth of from 1 to 10 mm. or more, after the manner of hieroglyphs, by a well-directed chiselling or chipping of the rock with the point of a hard instrument. This latter was perhaps a stone chisel of a similar type to that frequently used by the Central Australian tribes living to-day. The instruments were repeatedly searched for in the creek beds, and in the débris at the base of the rock-surfaces, but without result. In several places, however, numerous irregular and deep incisions in the rock indicated where a sharp-bladed instrument had been ground and sharpened. See below (page 211 and Plate XVII).

In some cases the whole space occupied by the design is seen to be chipped away as a true intaglio; or the outline only may be thus treated, leaving the centre of the field intact; in others the space is pitted all over with separated chisel marks; and lastly, the outline only may be indicated by sparsely distributed marks. It is possible that some of the designs had subsequently been covered with ochre or charcoal, but positive traces of these have long since vanished.

Age of the Designs.

It is a well-known fact that the aborigines usually exercise their artistic tastes and talents while camped at a water-hole or under a rock-shelter during the heat of the day. When thus congregated, the men will spend much of their time in eager and competitive production of designs upon the roof of the shelter, or the natural surfaces of the rock. The living generation of blacks in the Flinders Ranges know nothing about the carved productions of art here discussed. They barely recognise in them the handicraft of a people who, in all probability, were their direct ancestors. At Wilkindinna and Deception Creek it is apparent that many of the designs occur in places to which it would now be difficult, and almost impossible, for a native to find his way, much less to cling to and chisel the rock at the same time. The only explanation to be tendered of the occurrence of designs in those places is that the contour has altered, and that the rocks have suffered considerably by denuding processes since they were chipped by human hand.

The latter supposition is strengthened by the fact that many tumbled blocks of rock were found in the valley below, bearing part of a design, the other portion of which remained *in situ* on the cliff above. In several cases a design was found to be bisected by a gaping joint or fissure in the rock. There is no doubt that the constituent parts were originally more or less contiguous, and have become separated by subsequent earth movement. This seems the more likely, since in a few instances a slight faulting along the fissure has thrown one half of a design to a level different from that occupied by the other.

The strongest geological evidence in support of great antiquity lies in the presence of a dark rust-coloured "patina" or glazed surface-film, which everywhere covers the exposures of rock and carvings alike. Such glossy protective-films (the "braune Schutzrinden" of German authors) appear to be characteristic of all hot desert regions, but their origin has not been definitely explained. Mr. A. Lucas¹ favours deposition by water evaporating from the rock. I am inclined towards the same opinion, but imagine that the excessively fine, floating and suspended material in the desert atmosphere may also take part in the formation.

Professor Walther, in his work entitled "Die Denudation in der Wüste," refers to the phenomenon, and quotes the following example: The blocks of stone upon the summit of the Pyramid of Cheops and the faces in the Turra Quarries, from which the stone was cut for the building of the Pyramids of Ghiseh, are coated with a thin brown film. The surfaces that are thus covered bear the marks of the chisels used by the ancient Egyptians living about 3,000 years B.C. Geologists are agreed upon the fact that it takes a very long time for the protective film to grow to any appreciable thickness. Professor G. Schweinfurth² is very emphatic in his remarks upon certain animal-designs he discovered in Egypt. He states: "Diese Tierbilder versetzen uns im Geiste in jene Zeiten, da die Urbewohner von Aegypten und Nordwestafrika ähnliche Zeichnungen in die Felswände einkratzten, die in den Sandsteintälern Oberaegyptens häufig angetroffen werden und von deren hohem Alter die bräunliche Patina Zeugnis ablegt, mit der die Linien bedeckt erscheinen, während datierte Inschriften aus der Zeit der fünften und sechsten Dynastie (bei El Kab), die z. T. über die älteren hinweg eingeritzt wurden, aussehen als wären sie von gestern, wie Professor Sayce bezeugen kann." Jean Capart³, too, remarks that the primitive *graffiti* can be distinguished from those of the historic period by the patina which covers them.

In the Australian examples, the film covers the rock surfaces as well as the designs. In some cases there is no appreciable difference between the film on the rock and that on the design; in others the designs look quite fresh, and, if they show anything at all, it is but a rudimentary glaze. The latter are often found carved over the presumably older designs.

If we assume that the conditions for the growth of the film are similar in the arid regions of Australia and in those of Egypt (and there is no reason why they should be otherwise), the conclusion is that equal increments in the thickness of the films would, roughly, represent equal lapses of time. Professor Schweinfurth, with whom I had the privilege of discussing this matter in his museum at Potsdam, kindly showed me a series of specimens with a film upon them, collected by him in the desert of Assuan. He was good enough to present me with a few specimens to compare with the Australian rock chippings. I have come to the conclusion that

¹ *The Blackened Rocks of the Nile Cataracts and of the Egyptian Deserts.* By Authority, Cairo, 1905.

² *Aegyptische Tierbilder als Kieselartefakte*, Die Umschau, vol. vii, 1903, p. 806.

³ *Primitive Art in Egypt* (transl. by A. S. Griffith), 1905, p. 203.

the films from the southern hemisphere are quite as thick as those from Egypt, perhaps a little thicker. I would, therefore, attribute to the Australian designs a very considerable antiquity.

In my preliminary note¹ on this subject, I pointed out the probable association of the Australian aboriginal with extinct mammals and struthious birds, mentioning among other things, a petrified human calvarium from the Pliocene or Pleistocene mammaliferous drifts of Tennant's Creek in Central Australia, and certain stone implements, found by Professor Klaatsch, in the fluviatile deposits of King's Creek and the Darling Downs in Queensland. Secondary redistribution of deposits of different ages by flood-waters could, of course, be made responsible for the association of human remains with extinct animals, but it is advisable to make a note of all such instances. The doubt now appears to have been further cleared away by Mr. E. C. Andrews², who records the occurrence of native ovens in the Forbes-Parkes Goldfield, eighteen feet below the surface, and associated with the bones of the *Diprotodon*.

I had formerly suspected that some of the carvings I had seen at Balparana and Wilkindinna were, perhaps, intended to represent the tracks of creatures which lived in the days when the Central Australian lakes were fed by running waters derived from a bountiful supply of rain (which, under the present arid conditions, has been reduced to an average maximum of only ten inches per annum). Although, in direct reckoning, the number of years that have passed since the cessation of the pluvial period are very great, the day is, geologically speaking, not so very remote since extinct species of birds and animals lived throughout Australia. I have previously drawn attention to the possibility that the large emu-like tracks, carved into the rocks at Balparana, might have been intended to represent the tracks of the Australian "moa" or *Genyornis*. Even to the present day, the traditions of the natives embody references to emu-like and other monsters. Professor J. W. Gregory,³ as the result of his researches in Lake Eyre region, states that "the Kadimakara legends clearly relate to two different animals—one, a creature with a horn in the middle of its forehead, is no doubt the *Diprotodon*, which has a horn-like projection on its skull. In other stories, the Kadimakara are represented as reptile-like animals that lived in the water-holes and devoured people who ventured into the pools. The latter stories are no doubt based on the crocodile, which at one time certainly did extend as far south as Lake Eyre. But the legends do not prove the association of man with either the *Diprotodon* or the crocodile in the Lake Eyre region. The story of Kadimakara descending from the sky by gum-trees reappears in another form among the tribes on the western side of Lake Eyre."

¹ *Zeitschrift für Ethnologie*, Berlin, 1907, pp. 716, 717.

² *The Forbes-Parkes Goldfield, New South Wales*, Department of Mines, Mineral Resources No. 13, Sydney, 1910, pp. 19 et 27.

³ *The Dead Heart of Australia*, *The Register*, Adelaide, February 23rd, 1902.

Professor Gregory¹ does not, however, seem to favour the idea of assigning any considerable antiquity to man in the South-East of Australia.

As regards the significance of these ancient carvings in the rocks in the Flinders Ranges, I would point out that the natives, though in other respects appearing somewhat slovenly, must be given credit for exactness and regularity in the reproduction of tracks, be they those of their own kin or those of animals they hunt or come into frequent contact with. Children are entertained and educated from early infancy in recognizing the foot-prints of their parents, associates, and various animals that will frequently be encountered in after-life. One often has occasion to walk into a camp and find a remonstrating and pitifully howling little urchin pleading to be taken to its mother. The only aid forthcoming from the blacks will be to direct the attention of the child to the footprints of the parent in the sand, and to urge it to follow them up. Often the parents are within hearing distance, but purposely concealed in order that the child may take a lesson. I have described² a few methods of imitating track-production, from the Musgrave Ranges.

It would be superfluous for me to attempt to give instances of the inestimable value the natives have been to the police-departments in criminological investigations as black-trackers. That these people, therefore, would exercise a certain amount of care in the reproduction of a spoor is certain, since upon knowledge and familiarity of this kind their livelihood depends; and more, the acquisition of this knowledge represents part of the recognized standard of their educational system.

If, therefore, among the ancient renderings of art, we repeatedly find natural forms reproduced, which at the present day we cannot assign to any known creature, and if we have palaeontological evidence on hand which may assist us in the diagnoses, then I think we are justified, in the presence of a reasonable comparison, in inferring that the doubtful figures took their origin in forms that have since become extinct. At any rate, the possibility of such being the case should receive careful consideration. Then, if further evidence is elicited by subsequent research in this direction, these Australian relics of primitive art may yet rank as the equivalent of the engravings and mural decorations of the prehistoric peoples of Europe.

If we look at the large tracks from Yunta Springs and Wilkindinna (Plates XIV, A, and II, B), we notice a form, rounded at one end and possessing four or five equal-sized, pointed processes at the other. The rounded end may be regarded as the posterior aspect, the pointed processes as the imprints of the toes of a huge track. The enormous size (twenty-five cm. long by nearly as much wide) makes it quite impossible to find any member of the present fauna of Australia which would even suggest an explanation. The track of a wombat, though similar in outline, falls much short of it in dimensions. The nearest footprint of any living animal we might find to answer the form of the carving would perhaps be that of a

¹ "Antiquity of Man in Victoria," *Trans. Royal Society Victoria*; xvii (N.S.), 120, 1904.

² *Trans. Royal Society S. Aust.*, vol. xxviii, 1904, p. 30.

hippopotamus. This animal, of course, is not, and was never, indigenous in Australia, but comparative anatomists and zoologists have informed us that an extinct giant marsupial of Australia, namely the *Diprotodon*, might in outward appearance have resembled a hippopotamus. Reference to the figures of the reconstructed manus and pes of the *Diprotodon*¹ tends to support the idea that the carvings in question were intended to represent the track of this animal. Compare figures 1 and 2.

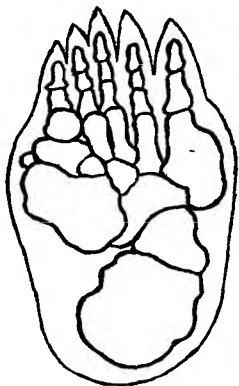


FIG. 1. RECONSTRUCTED MANUS OF THE DIPROTODON (AFTER A SPECIMEN IN THE ADELAIDE MUSEUM).

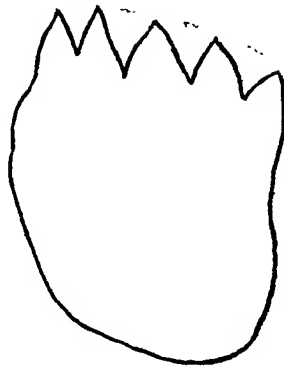


FIG. 2. OUTLINE SKETCH OF A CARVING OF THE SUPPOSED DIPROTODON TRACK. YUNTA SPRINGS.

In the light of these considerations, the large dimensions of some of the emu- and kangaroo-like tracks at Balparana, and elsewhere, might readily be explained if we consider the tracks as being intended to represent those of now extinct giant forms.

Then, too, one might tender as further possible evidence of age, the representation of what is strongly suggestive of a platypus (*Ornithorhynchus anatinus*) amongst the carved designs at Red Gorge. This monotreme is, nowadays, absent from Central Australia²; consequently one explanation of its picture being upon the rocks would be that, in the days when the aboriginal artist carved its form, the habitat of the platypus extended inland to those regions.

We know that later tertiary loams and lacustrine deposits in the basins of Lakes Eyre, Callabonna, and others, have yielded ample palaeontological evidence of pluvial condition in not very remote geological periods in Central Australia, being, indeed, contemporaneous with those of a widespread glaciation in more southern latitudes. Fossil turtles, crocodiles, fish (notably *Ceratodus*), and fresh-water mussels (*Unio*) have been found in number. The drainage-systems of the lakes referred to now exist as sub-rivers, which only during prolonged inundation

¹ Vide E. C. Stirling and A. H. C. Zietz, *Memoir of Royal Society South Australia*, vol. i, Plates I and X.

² As a matter of fact there is some reason for believing that the platypus has been observed living in Dalhousie Springs, Central Australia. The description given by natives of some animal seen by them in the springs, and the corroborative evidence by a reliable bushman, are responsible for this belief, although there is no scientific record available.

swell to anything like the dimensions they must have had in Pleistocene, and possibly more recent geological days. Would it be assuming too much to explain the presence of the platypus design as having been executed by a man who had actually seen the creature alive in Central Australia? An alternative to this theory would naturally be that the designs were cut into the rocks by natives hailing from nearer the coast, who migrated inland, or were in the habit of wandering that way on a hunting, ochre-collecting, or other expedition; but the latter does not seem altogether likely.

Description of designs.

I shall describe the separate series of designs in the order in which they were discovered. The BALPARANA group consists essentially of diagrammatic representations of the tracks of animals and birds, and the "corroboree-circle."

In Plate I, A, Figs. 2, 4, 6, 9, 11, 12, 13 and 19, are indubitable tracks of either the emu (*Dromaius Novae-Hollandiae*), or the bustard (*Otis australia*), and the paired Figs. 1, 5, 14 and 15 are those of the kangaroo. The dimensions of Fig. 20 are so large (being about 17 cm. in breadth), when compared with the other bird-tracks, that, should it be intended for an emu-track, all the others must be considered as those of bustards. I have already referred to the possibility of an extinct species having been intended. Fig. 17 resembles a craft with three masts, but it is very improbable that it was meant to stand for such. A more likely explanation is that it is a transformation and expansion of some other design, possibly the fusion of two or three of the emu-tracks. Figs. 18, 8, and 7 must be regarded in the same light; but the latter two may stand for crossed boomerangs, such as I have recorded¹ from the Mann Ranges.

Fig. 3 is a very doubtful dog-track, which is too large in comparison with the bird-tracks mentioned. Fig. 10 may be a dog-track also, but is more probably that of a bird. Fig. 16 is a corroboree-circle.

In Plate I, B, Figs. 1, 2, and 7 are similar corroboree-circles, the last mentioned being a group of two circles, one within the other, cut by a more or less vertical line. Figs. 3, 4, 5, 6, 8, and 9 are emu- or bustard-tracks.

The WILKINDINNA group practically repeats the salient features of the designs just described. In Plate II, A, we notice three circular Figs. (1, 2 and 4), and many more exist on the adjoining rock surfaces. They range from 10 to 30 cm. in diameter and usually enclose emu and other tracks (Figs. 1 and 4). Fig. 3 is similar to Fig. 17 of Plate I, A: three emu-tracks have their lateral toes united, giving the effect of an arc of a circle with three uprights resembling, as before, the masts of a craft. One of the circles on this face, not included in the plate, was 15 cm. in diameter, and was divided into six segments by five vertical bars. The light portions visible in this plate are pebbles embedded in a mudstone formation. The designs are much denuded, and a thick glossy patina covers them.

¹ *Vide Trans. Royal Soc. South Aust.*, 1904, vol. xxviii, p. 43, Plate VI, Fig. 2.

Plate II, B, presents a well-preserved group of carvings on a joint-plane in beds of highly contorted clay slates, which adjoin the mudstone seen in the previous plate. Numerous circles are represented, some being defined by a single row of disconnected chip-marks (Figs. 1, 2, 3, 5, 6, 7, 9, 10, 11, 15, 18), others by a broad, chiselled band (Figs. 4, 12, 17). One of them is divided into four quadrants by two diameters at right angles to one another (Fig. 10) and others contain emu- or bustard-tracks (Figs. 12, 15). Two prominent kangaroo-tracks (Figs. 13, 16) and several emu- and bustard-tracks (Figs. 8, 19, 20, 21) are in this group. One very large intagliated design (Fig. 14) resembles the footprint of a quadruped, but no living form of the Australian fauna approaches it either in outline or size. The possibility of its connection with the extinct *Diprotodon* is considered elsewhere.¹

Many other markings of unknown meaning cover the rock face.

The DECEPTION CREEK group (Red Gorge: *vide* Plate III, Fig. 1) contains many instructive forms. Plate II, A, depicts four figures of exceptional clearness. Fig. 1 is the slender form of a monitor (*Varanus*), 64 cm. long; Fig. 2 a bustard-track. Fig. 3 is a pubic tassel of a similar kind to that worn by the numerous Central and Northern Australian tribes at the present day. Fig. 4 is an ingenious picture of a standing owl. The prominent eyes and large beak between them, the body and legs, are clearly drawn, but the wings are not indicated. The instrument shown in this picture and the following series of photographs serves as a scale; it is a 6-inch clinometer-rule.

In Plate IV, B, another owl is shown, in which two lateral projections clearly indicate the wings. The eyes and the beak are conspicuous, the latter standing out vertically from between the visual organs. The body and head, but not the legs, are encompassed by a circle. Fig. 2 is an emu-track, Fig. 3 an imperfect one of the kangaroo.

A very definite picture of a lizard, fully 60 cm. long (Fig. 1), stands out boldly in Plate V, A. Evidently quite a different species is intended from that shown in Fig. 1 of Plate IV, A. In the present case the form is squat and broad, with inflated belly and large rounded head; in the former case (in Plate IV, A), the form, though approximately the same length, was decidedly slender and possessed a narrow elongated head. Two lateral prominences on the head of the squat form are no doubt intended for the supraorbital osseous developments which occur in some lizards. Whereas in the former case we had no difficulty in determining it as a monitor, I am in the present case unable to offer any nearer explanation than that a reptilian is intended; no living form exists in the region that would answer the picture. In Fig. 3, however, one is again able to select the identical form intended; it is one of those stumpy and short-tailed forms commonly called Jew-lizards (*Grammatophora*). Near to it is another partly completed design, and in Fig. 2 a third. The remaining markings can be readily distinguished as small kangaroo- and bird-tracks.

¹ *Vide* p. 202, and *Zeitschrift für Ethnologie*, 1907, pp. 715-717.

Plate V, B, is of considerable importance, since it contains the picture of what appears to be a duck-billed platypus (*Ornithorhynchus anatinus*) (Fig. 4). It measures 33 cm. in length, and 70 in width. The prolonged snout or "duck-bill," the head, the plump body, the stumpy tail and the short legs may be recognized; even the claws of the right hind limb are visible. The platypus-theory failing, an echidna would seem the next nearest explanation. Fig. 8 is a curious looking design which in all probability is a combination of two, namely an original bird (as described above) over which a blackfellow's footprint has been carved at a later date. An alternative explanation is that the whole represents a crested cockatoo. The former is, however, the more likely, since the adjacent design (Fig. 7) is without doubt a blackfellow's track, and another smaller one lies in the circumference of the circle on the left of it (Fig. 10). Above this group are the vertical strands of a pubic tassel, without the horizontal binder or waist-band (Fig. 6). The remaining figures are kangaroo-tracks (Figs. 1, 2, 3, 5 and 9), though Fig. 1 may have the same meaning as Fig. 1 in the following plate.

Plate VI, A, brings something new in Fig. 1; there is little doubt that two long-handled stone knives are intended. The pointed stone blades, the ball-attachment of resin, and the long wooden hafts are quite distinct. The total length of the design is about 47 cm. Similar types of knives are still to be found among Central and Northern tribes. The paired nature of the design would at first sight suggest the imprint of a kangaroo's hind limbs from the toe to the hock, but the presence of two other designs (Figs. 17 and 20), which are not paired, is in favour of the stone knife. The two last-named figures are certainly meant for the type possessing a simple blade with a resin haft, common in Central Australia. Figs. 15, 16 and 18 are kangaroo- or wallaby-paws, with very prominent claws. Fig. 19 is a clearly drawn dog-track; while Fig. 11 may be the same, but is more likely a blackfellow's track. Fig. 12 is a small lizard; Figs. 14 and 21 cannot be identified. The remaining numbers in the plate are attached to bird-tracks, small kangaroo-tracks, and circles.

A curious combination of forms occupies a space in Plate VI, B, Figs. 2, 3, 4 and 5 being more or less completely linked together. Of them No. 2 is a bird, probably an owl, No. 3 a lizard, and No. 5 perhaps the same. Figs. 8 and 7 are lizards. In the group represented by Fig. 9, we have two undulating lines that stand for a snake or its track. Fig. 10 is a complete circle, about 23 cm. in diameter, with one emu-track within and another without it. Fig. 1 is a blackfellow's track; the remaining markings are bird-tracks.

Of the group of figures in Plate VII, A, Nos. 1, 6, 7 and 9 are lizards of various sizes and forms; the largest central figure (No. 6) is 78 cm. in length. Fig. 2 is an echidna (or native "hedge-hog") and it is possible that Figs. 3 and 8 have similar interpretations. Of the remaining, Fig. 5 is a blackfellow's track and Figs. 4 and 10 are kangaroo-tracks.

Apart from several imperfect lizards (Figs. 1, 2, 8, 11 and 13), Plate VII, B, contains an echidna (Fig. 15). Two circles (Figs. 7 and 12) each enclose a small

group of markings consisting of kangaroo-tracks (Figs. 4, 5 and 10) and emu-tracks (Figs. 6 and 9). Over the fore-limbs of the small lizard (Fig. 11), moreover, another pair of kangaroo-tracks has been carved, lending the whole a somewhat queer appearance. Outside the circles, similar tracks of marsupials are seen in Figs. 3 and 14, while a single emu-track (Fig. 16) adjoins the lizard in the centre (Fig. 8). A conspicuous figure in the plate is a spider-shaped carving (Fig. 17) standing partly in the circle on the right (Fig. 12), and consisting of a central, dark circular space, from which emanate, radially, nine short and three or four long arms, the latter passing vertically downwards to the bottom of the plate. Two similar, though smaller, designs are noticed in Figs. 18 and 19. The surface of the rock, it will be noticed, is pitted all over in the neighbourhood of the echidna design (Fig. 15).

Plate VIII, A, shows a slab of limestone which has tumbled from the walls of the Gorge into the bed of Deception Creek. Upon it is a group of designs, some of which are incomplete (viz., the circles of Fig. 1), as the result of the fracture which severed the slab from its position *in situ*. Several such cases were noted among the débris in the creek. Fig. 1 consists of two or three incomplete concentric circles in association with emu-tracks. A similar combination, though with very much smaller circles, is seen in Fig. 4. Kangaroo-tracks of various sizes are to be noted in Figs. 2, 3, 5, 6 and 9. A combination of circles with tracks occur in Fig. 8; the adjoining Fig. 7 is an echidna, whose surface is pitted all over, the limbs and snout being more uniformly incised.

DECEPTION CREEK EAST (Plate III, Fig. 2): The second occurrence in Deception Creek lies from about one to one-and-a-half miles east of the Red Gorge. The vertical faces of the Gorge, especially the northern, are covered with countless designs of a similar type to the series already described. They extend throughout the whole vertical exposure, from the level of the dry creek bed to the very top. Plate III, Fig. 2, gives a very fair impression; by a careful examination of the reproduced photograph, the rock faces will be seen to be marked all over with such designs as have already been described. The riven character of the limestone country will also be apparent.

In glancing over the reproductions of a representative series of carvings from this locality, we observe in Fig. 1 of Plate VIII, B, an excellent picture of an owl, such as we have already made the acquaintance of in the above series. It measures 30 cm. in length. Next to it (Fig. 2) is a blackfellow's track, of natural size, but showing a deficiency of one toe, not an uncommon feature in native drawings. The only other carving is that of an emu-track (Fig. 3) with a much elongated central toe.

A series of allied forms occurs in Plate IX, A. While there is no doubt that Fig. 3 is an owl such as occurs in the preceding plate, considerable doubt exists in regard to Figs. 1, 2 and 4. Although there is a general resemblance to the owl design, the presence of four lateral processes in Fig. 1, and what appears to be a caudal appendage in Fig. 2, distinguish these forms from an owl with two lateral

processes standing for the wings, such as are present in the form figured in Plate IV, B. Fig. 4 would be more nearly an equivalent of this. In Fig. 5 we have an interesting transition stage between designs of the aforesaid owl and that of a human being. If it had stood alone, I should have unhesitatingly described it as a human figure, but in view of the adjoining forms, this determination must be accepted with some reserve. Other familiar objects are represented elsewhere in the plate, notably the group of emu-tracks composing Fig. 6. A number of dark spots will be noticed upon the surface of the rock; these were produced by the large drops of rain from a passing thunderstorm, which set in just as the photographic plate was being exposed.

Plate IX, B, presents new features: Fig. 7, whether intended for the picture of a bird or a man, shows the subject in a remarkable posture, viz., with legs crossed. This is a favourite position of most native peoples, but is scarcely that of a bird. Two lateral processes, near the top, might be regarded as arms, and a small vertical projection above, in the median line, as the head. But it must not be forgotten that a fusion of an original design with an emu-track at its crest may be the true explanation. The figure measures 50 cm. in length. Among the other markings, we recognize two blackfellows' tracks (Figs. 2 and 5), a lizard (Fig. 3), an emu-track (Fig. 1), and a kangaroo-track (Fig. 6). Figs. 1, 2 and 3 are partly contained within a large imperfect circle. The rest of the markings are doubtful.

Additional interest is added to any primitive exposition of art when, apart from the psychological significance and the talent displayed by the individual for copying from nature, one is able to discover a likely phase in the evolution of decorative art. An instance of this kind lies before us in Plate X, A. We have frequently had occasion to refer to the pictorial representations of lizards, drawn with so little accuracy that a specific identification was impossible. Another design often met with, was that of a spiny anteater or echidna. Among the several forms contained in Plate X, A, which is now under discussion, occurs an interesting series of allied figures, in some of which it would be impossible to declare whether a particular form had been taken from a mammalian or a reptilian model. Fig. 1 is clearly a group of two of the monitor type of lizard designs, as defined in Plate IV, A. Fig. 13 is one of the round-headed, squat forms figured in Plate V, A, and it is clear that Figs. 18 and 6 are representations of those slothful, stumpy-tailed, Jew lizards, one of which is also figured on Plate V, A. When we come to consider the significance of Figs. 3, 5, 9, and 19, we are confronted with difficulties. A turtle might be suggested as an explanation, but this interpretation is doubtful. What seems more probable is that the artist has exceeded the limit of his talent for copying forms direct from nature and has embodied in his productions a certain amount of professional licence, with a view to establishing an ornamental figure that is not without symmetry, and, consequently, pleasing to the eye. Perhaps this explanation is too far-fetched, but in any case it appears that we have before us a transformation of an original, natural outline into a regular geometrical

or stellate design, the points of which have been suggested by the limbs, head, and tail of an animal. The artistic effect is somewhat enhanced when the design stands within a circle (Fig. 3). Amongst the other carvings will be noticed several imprints of human feet (Figs. 2, 4, 7 and 15), emu-tracks (Figs. 12 and 8), kangaroo-tracks (Figs. 10, 11 and 16), a doubtful echidna (Fig. 17), two pubic tassels (Fig. 14 and the one incorporating the footprint in Fig. 15) and a few circles and other smaller markings.

Another design which is not truly imitative, but ornamental in character, is reproduced in Fig. 1 of Plate X, B. I shall refer to it as the "cart-wheel pattern." It consists of two concentric circles, the outer one being about 40 cm. in diameter, the inner about 4 cm., which are connected radially by some thirty-eight straight lines. Within the field is enclosed an emu-track. The significance of the design is problematical, but I surmise that it represents a corroboree decoration. Several other identical designs were seen in the neighbourhood. The remaining figure (No. 2) in the plate consists of a group of two emu-tracks.

ORATUNGA CREEK.—The next occurrence of these primitive carvings or chippings discovered is on a vertical face of rock in the bed of Oratunga Creek. The number of designs is very limited, and the type uniform in character. In Plate XI, Fig. 1, the small exposure of rock upon which the carvings were found is seen as a dark face in the shade of the large gum tree on the right. The permanent water, known as the Third Springs, no doubt in former days a favourite camping place of the aborigines, is situated on the opposite side of the creek, but is not shown in the picture. The dry bed of the creek is seen trending westwards; in the distance the Mount Samuel Range. The site is not far distant from the old Moolooloo Station, which has become historically important since it was practically the starting point of MacDouall Stuart's Transcontinental Expedition in the year 1861.¹ "Moolooloo" is, so far as I could find out, the native name for the accumulated half cones of rock débris flanking a range.

The small collection of designs, here preserved upon a natural joint-plane in the rock that cuts the bedding at an angle, consists principally of circles, on an average about 15 cm. in diameter, emu-tracks, and wavy lines or snakes and their tracks. The group has no doubt some important connection with past religious ceremonies and corroborees that were enacted there. *Vide* Plate XII, A.

Leaving the several occurrences in the North Flinders Ranges and directing our attention to the localities where similar rock chippings were found, many miles to the south-east and south of the original discovery, we shall briefly examine the Yunta Springs and Mallett Springs carvings, in order to compare them with what we have learnt of the previous series.

YUNTA SPRINGS.—The carvings occur on the vertical faces of rock adjoining the springs, and in the stony bed of the creek that drains the overflow of water to the plain beneath. A smaller number may be found upon the scarped faces of the

¹ *Vide* W. Hardman, *The Journals of John MacDouall Stuart*, London, 1865, p. 326.

calcareous beds higher up the hill. In the photograph showing the scenery at the site of the discovery (Plate XI, Fig. 2), the springs occur near the bottom corner on the right, at the base of the vertical face of rock, a short distance to the left of the ti-tree on the extreme edge of the picture.

The group of designs (Plate XII, B) consists of a lizard, about 60 cm. long, the whole of whose surface is intagliated (Fig. 1). The upper portion of the head and part of the left fore-limb have been denuded away. Upon another surface, the position of which debarred me from photographing it, another such reptilian design measured quite two metres in length. Next to the former stands a "U-within-U" design (Fig. 2), nowadays often found in connection with the *churinga* and sacred ceremonies of some Central Australian tribes. Enclosed within it are a few markings, an emu-track, and a doubtful kangaroo-track. Next to it stands another similar but larger design, part of which is here reproduced in Fig. 3. It, too, is associated with a few tracks of the kangaroo (Figs. 4 and 4¹).

Another photograph (Plate XIII, A) shows part of the same design on a larger scale. The protective patina is seen covering most of the plate as a dark, glossy film. In the left top corner and along the same side, below, the film has broken away, leaving the unprotected weathered rock exposed as two lighter coloured triangular spaces.

The next photograph (Plate XIII, B) is reproduced to give an idea of the manner in which the rock has weathered since the designs were carved upon it; indirectly, therefore, an idea as to the time that has lapsed since their making. They are mostly incomplete circles (Figs. 1 and 2) and parts of the *churinga* loops and bars (Fig. 3). A number of kangaroo-tracks, some showing a lateral toe imprint, are seen in Figs. 4 and 5, while a single emu-track is recognizable in Fig. 6.

In order to explain the way in which the rock surface in the creek bed, and near to it, has been covered with countless designs that have been carved and re-carved one over the other, no doubt by several generations, I have added Plate XIV, A. The picture represents only a very small fraction of what is seen on the spot; large areas, many chains long and several wide, are literally carpeted with a labyrinthine network of designs. In parts, the action of flood waters has denuded the carvings in various degrees, in some cases beyond recognition; in parts, the rock surfaces have been worn bare. The designs on this flat, horizontal (not vertical) surface consist of the usual circles, tracks of men, snakes, kangaroos and emus, and other markings. Without attempting to describe any of the designs in this plate in detail, I shall only draw attention to the exceptionally large kangaroo-track, with clearly defined imprints of the lateral toe (Figs. 2A and 2B), which measures 22 cm. in length; and also to the huge track (Fig. 1) resembling that of a quadruped. The latter is not unlike that in the Wilkindinna group and measures about 25 cm. in length and nearly as much in breadth. I have already ventured to connect these extraordinarily large tracks, with the extinct fauna of Central Australia (*vide* p. 202). A very much smaller design (Fig. 5) which (taken in perspective & s

it is) seems to be disproportionately short, is no doubt intended to represent a wombat-track or an undersized human footprint.

The horizontal scale lying in the foreground is a foot rule. It must, however, be remembered that the photograph is that of a horizontal surface taken at an angle with a tilted camera; consequently the size of objects lying above the scale in the picture will appear considerably smaller than is really the case.

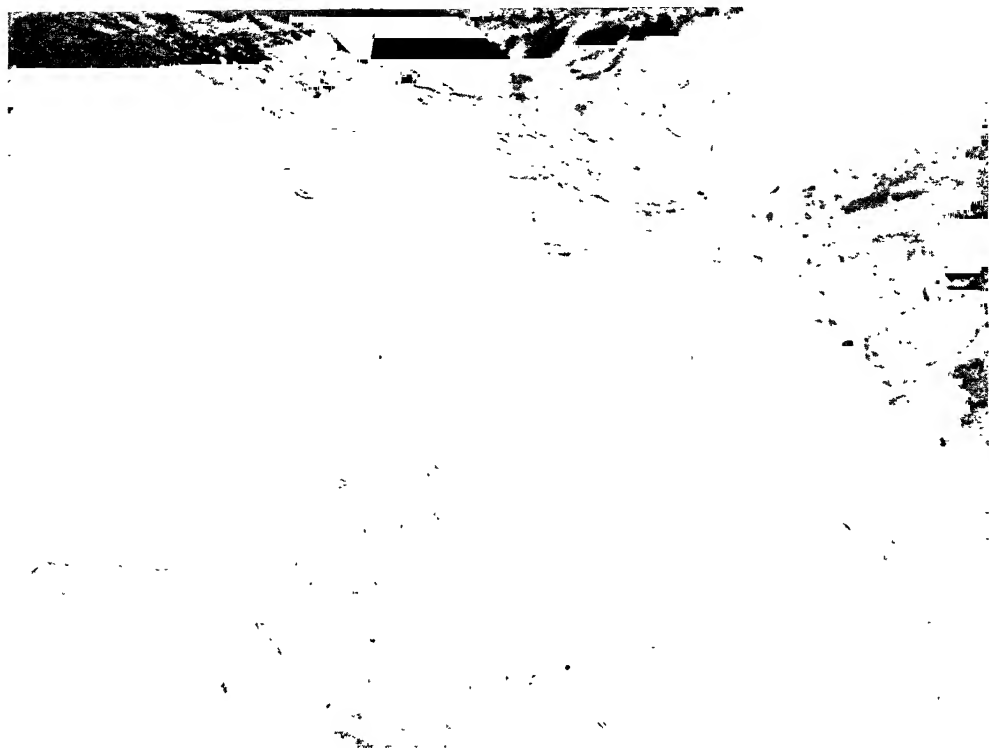
MALLET SPRINGS.—As last of the present series, a few remarks will be made upon the carvings in the Mallett Springs locality. The site is pictured in Plate XV, Fig. 1. The slightly overhanging ridge of rock seen trending at right angles to the plane of the paper, contains the principal group of carvings, namely, on the shaded side facing the dry and stony creek bed. A growth of rushes, between the rocks on the left, indicates the spot at which the springs occur. More carvings are to be found on the inclined slabs of rocks beyond, while parts of the rock surface forming the bed of the creek are crowded with designs that were carved at different times, in a manner similar to that of the Yunta Springs group.

Plate XVI, Figs. 1 and 2, are parts of the one and the same vertical exposure on the creek side of the ridges referred to above. The designs are, without exception, of one and the same kind, namely, the "U-within-U" pattern, first observed upon the Yunta Springs exposure. The whole surface contains many scores of such designs which have been cut into the rock, not without symmetry. They are disposed in more or less horizontal rows; the arms of the figures stand vertically, and the open ends of the U's are invariably directed upwards. From one to four, or more, U's compose each figure; a vertical straight line often stands in the middle of the innermost U. There seems no doubt that this series of uniform designs indicates a traditionally sacred spot, either where certain corroborrees were performed, or which was associated with ancestral legends and ceremonies. The same design is most frequently met with nowadays on the *churinga*¹ and "sacred stones" of Central Australia.

Plate XIV, B, contains a number of circles (Figs. 1, 2, 3, 5, 6 and 7), two of which are associated with the track of an emu (Figs. 2 and 7). Two extraordinary stellate forms are represented in Figs. 4 and 10, for which no definite explanation can be tendered. In some respects an analogy might be seen in the "cart-wheel" designs of Deception Creek (*vide* Plate X, B) and the spider-shaped figures of Plate VII, B. The remaining designs are tracks of emu and kangaroo, and certain other obscure markings.

The next Plate (XV, Fig. 2) is the reproduction of a photograph of a flat surface of rock in the bed of the creek, below the springs. As in the Yunta Springs example, a massed conglomeration of designs of all descriptions will be noticed to cover the whole of the surface. It, too, represents but a small proportion of the total area ornamented.

¹ The "churinga" of the late Mr. F. J. Gillen and "tjurunga" of Herr Carl Strehlow: *vide Report Horn Expedition, Central Australia, Anthropology*; and *Veröffentlichungen Stadt. Völker, Museum, Frankfurt, 1908*, respectively.

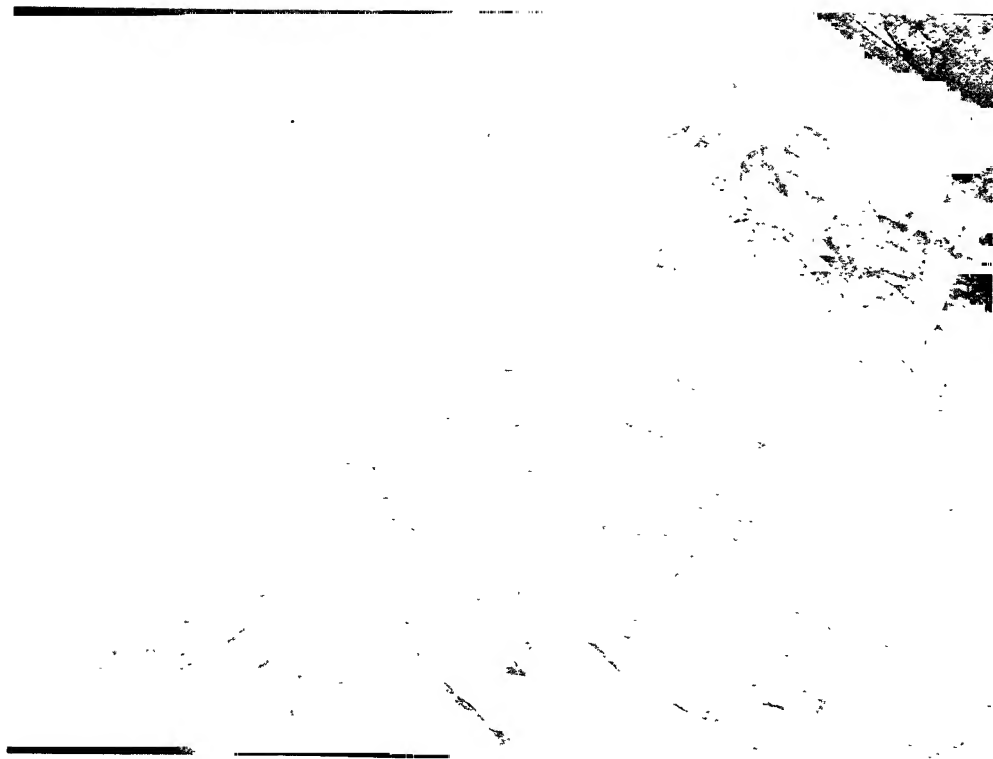


A.

B.



A.



B.

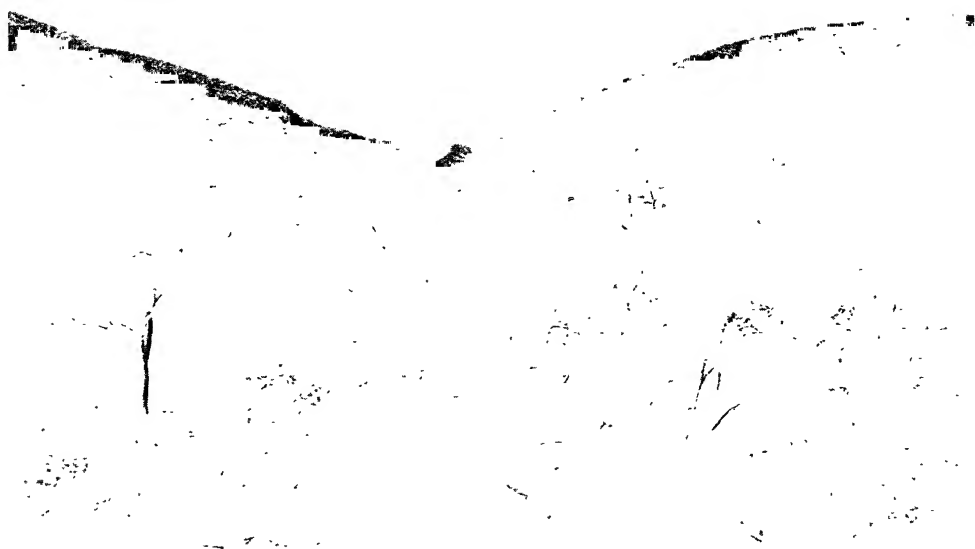
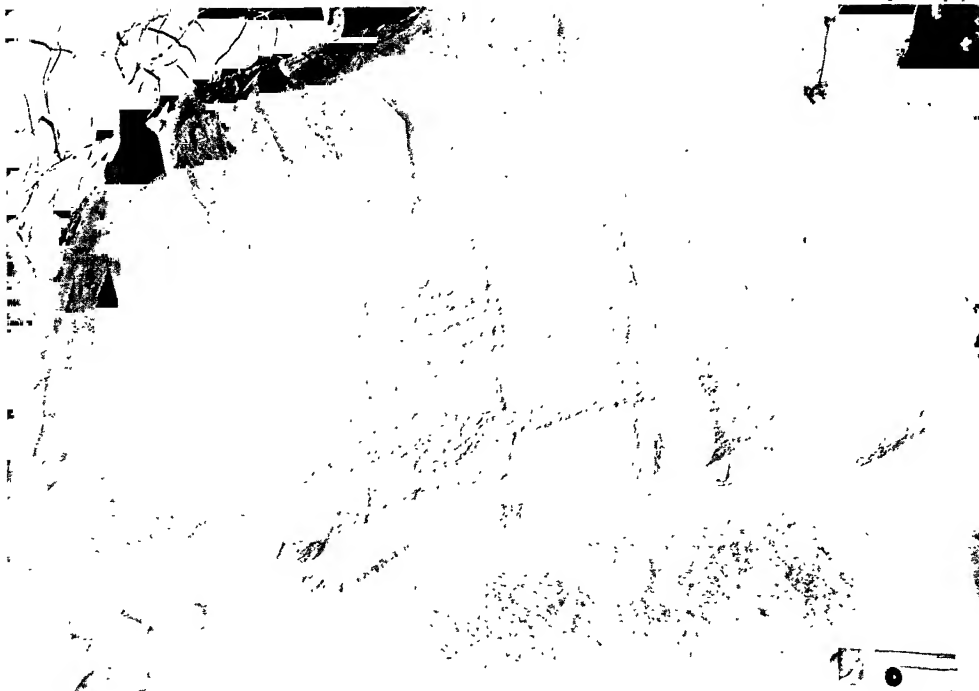


FIG. 1.



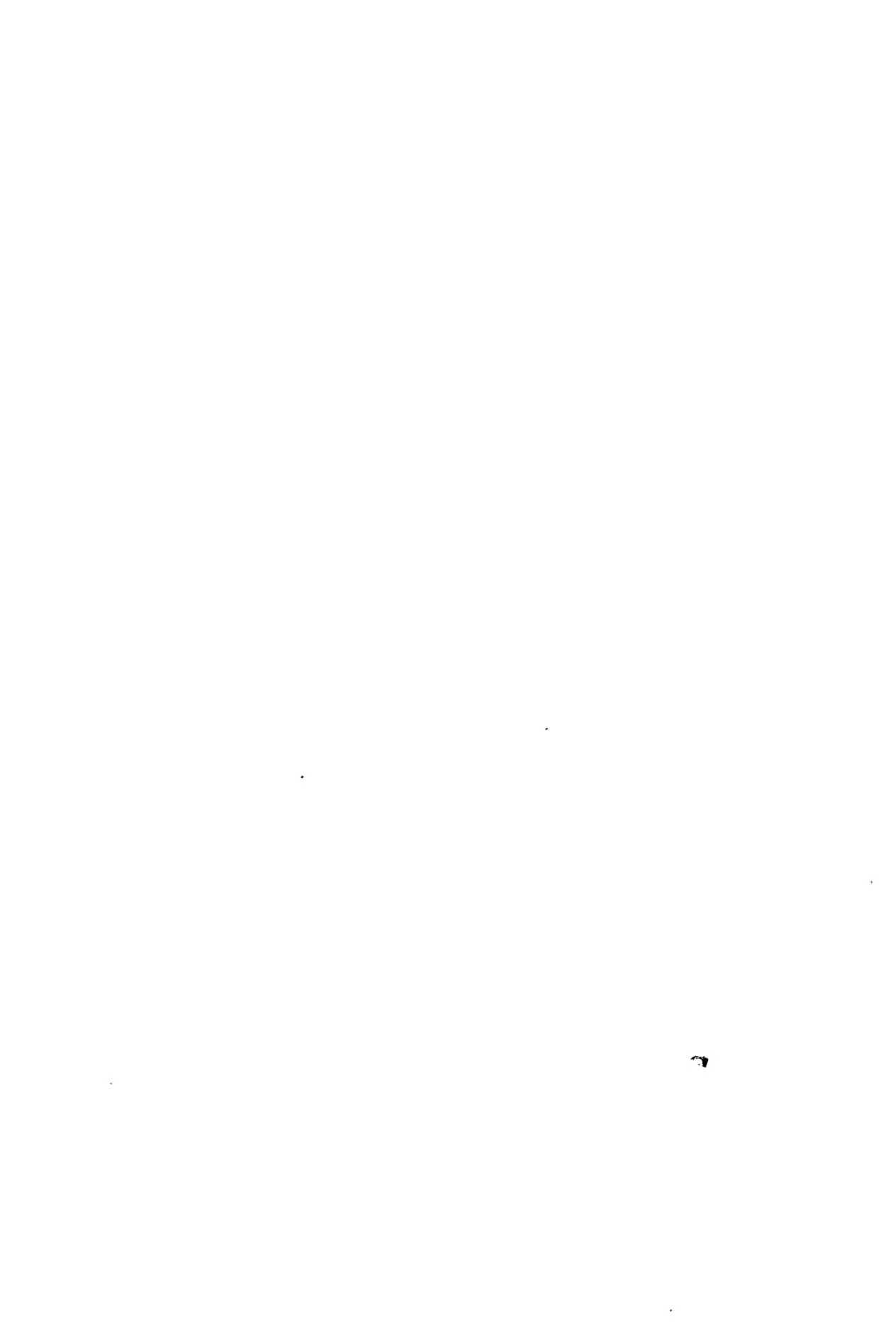
FIG. 2.

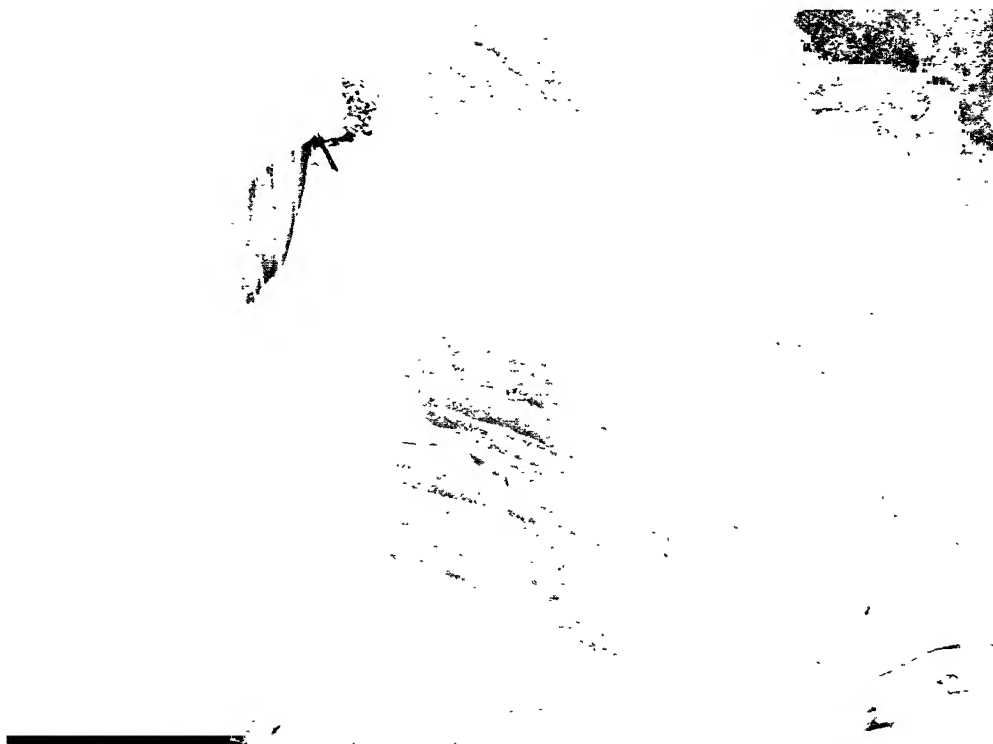


A.

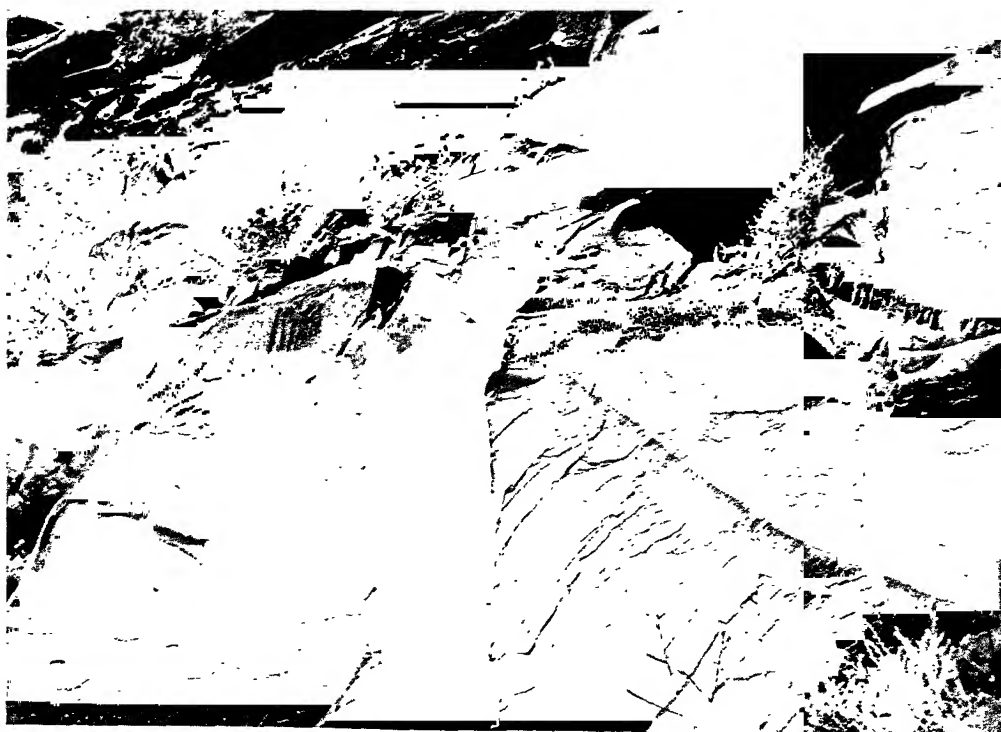


B.

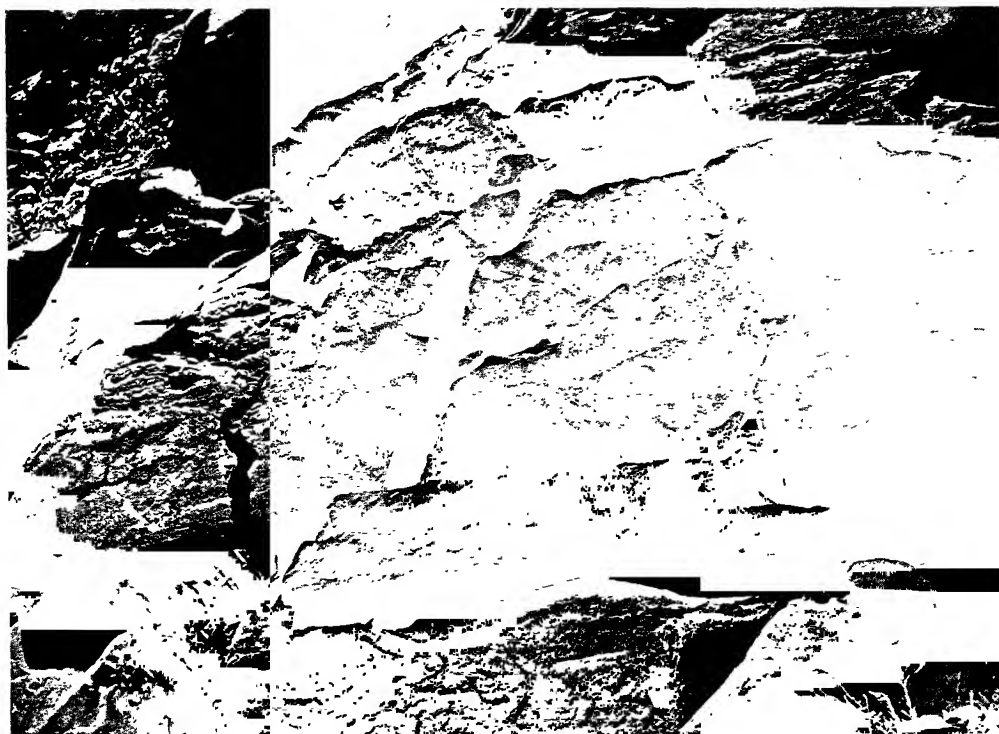




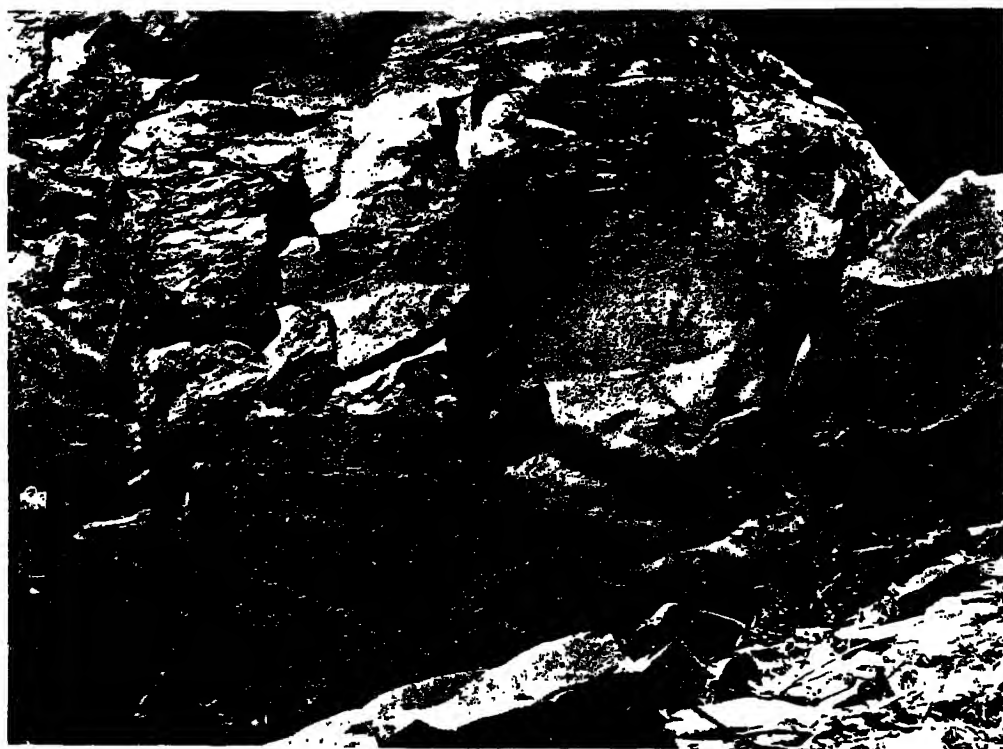
A.



B.



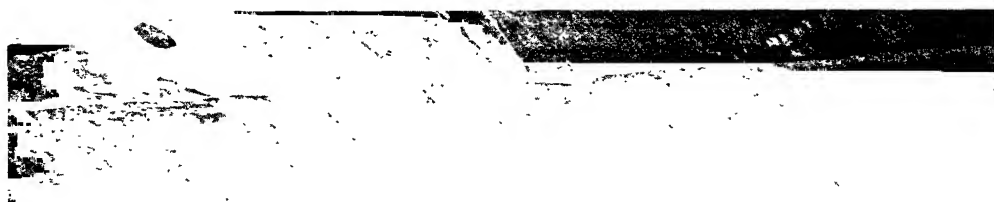
A.



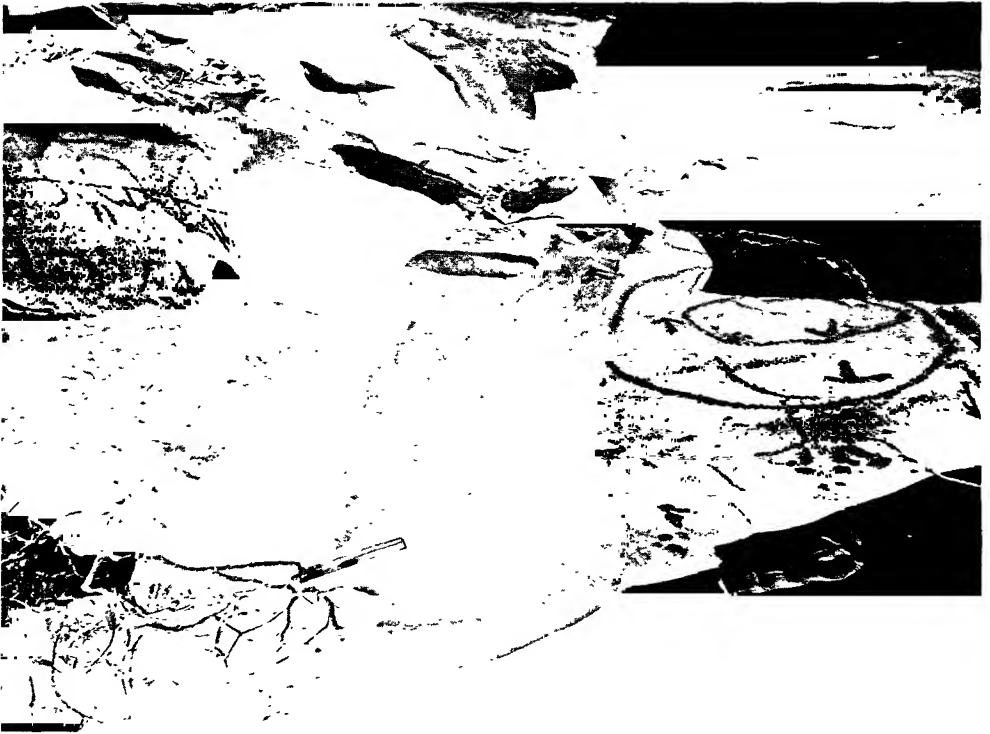
B.



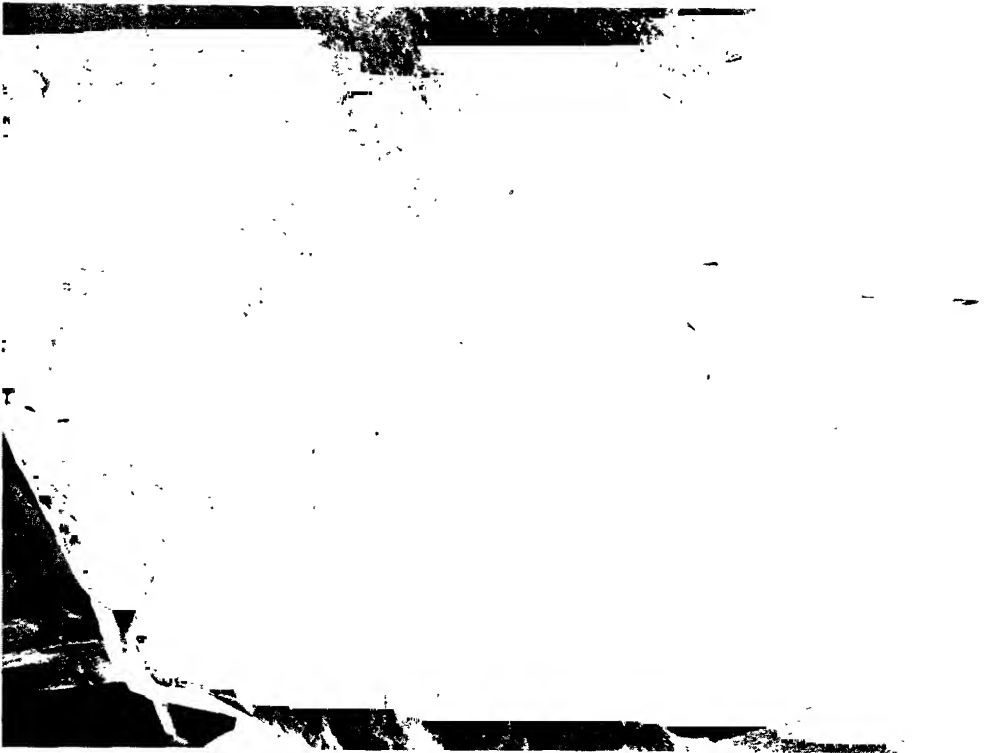
A.



B.



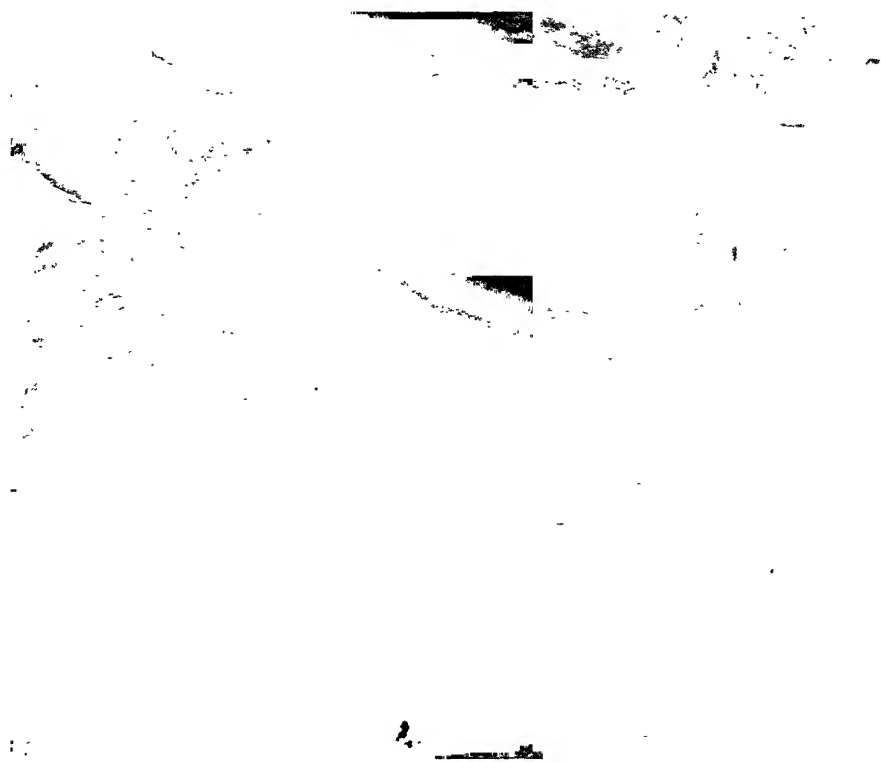
A.



B.



A.



B.



A.



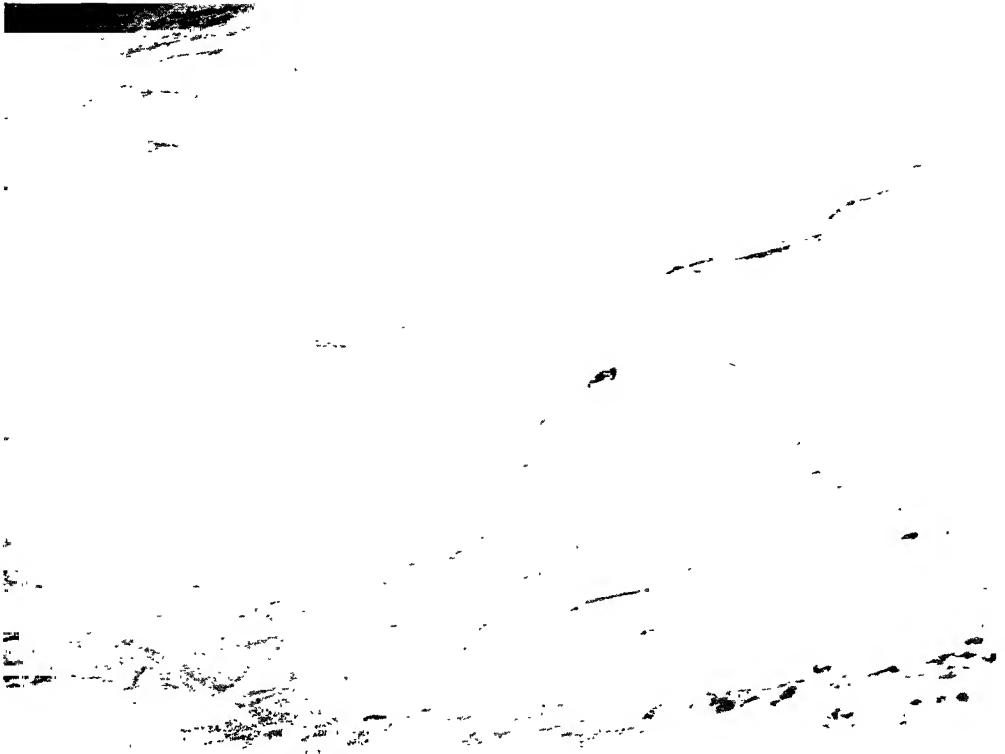
B.



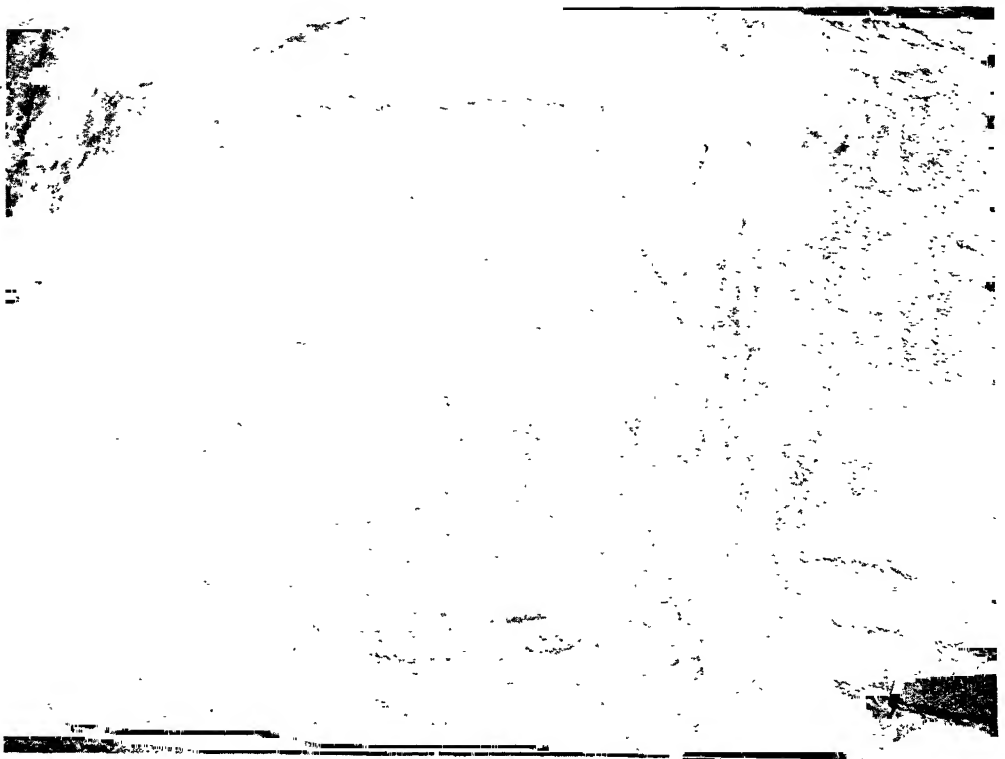
FIG. 1.



FIG. 2.



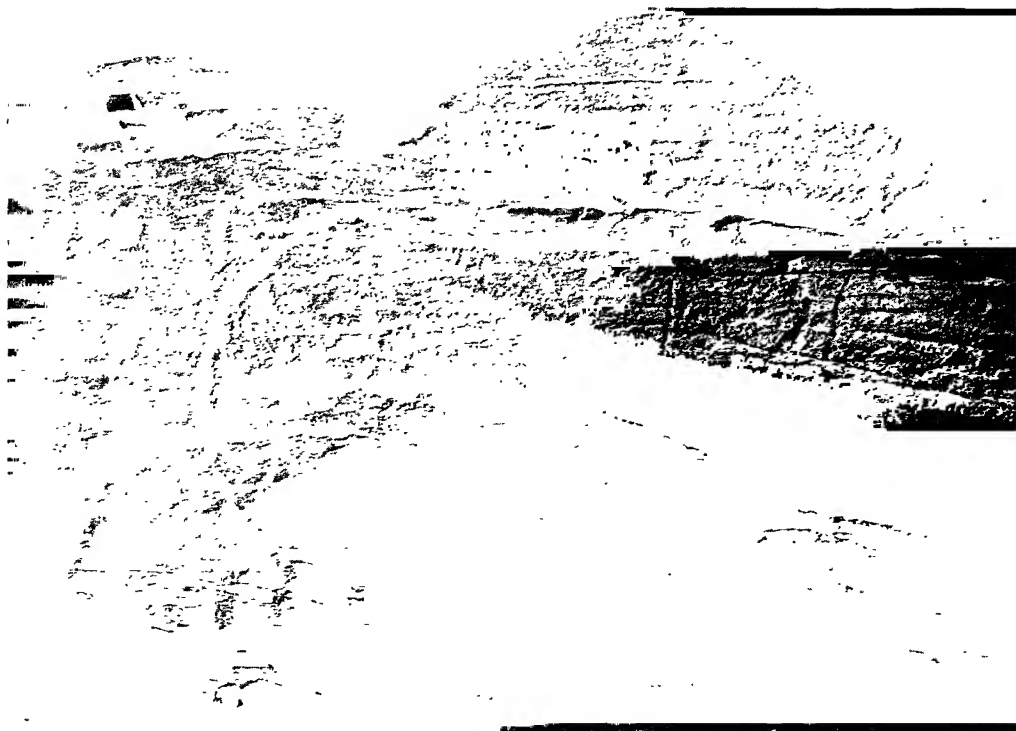
A.



B.

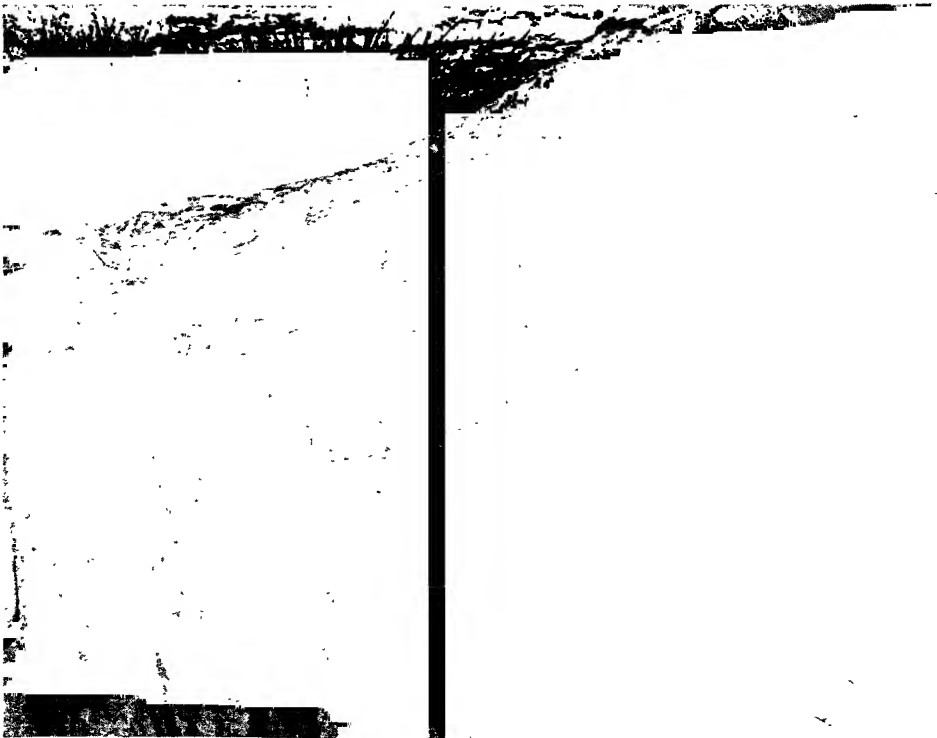


A.



B.

A.



B.



FIG. 1.



FIG. 2.

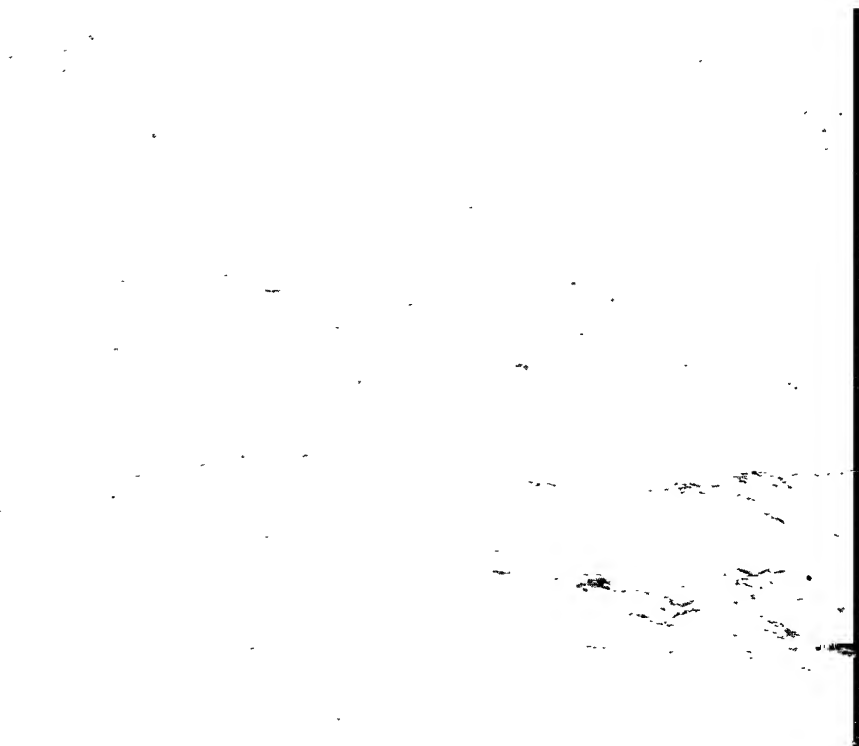


FIG. 1.



FIG. 2.



The last Plate (XVII) depicts a vertical face of rock, showing very numerous deep incisions and scratches which have resulted from a backward and forward abrasion, or grinding, by some sharp instrument. Practically the whole of the rock seen in the picture is thus disfigured, most of the grooves being more or less vertical in direction; a few scratches are at right angles and in other directions. It is evident that the points of the instruments used by the natives were ground and sharpened in the grooves preserved in this exposure of rock. It is worthy of notice that apparently a particular portion only had been allotted for grinding purposes, since apart from it only occasional grooves were noticed in the rocks near by.

Acknowledgment.

In conclusion, I wish to acknowledge here my indebtedness to Messrs. W. A. Ferguson and J. D. Lindo for the kind assistance they rendered me, and for the facilities they offered me during my examination of the carvings in Deception Creek and Oratunga Creek, respectively.

EXPLANATION OF PLATES.

PLATE I.

Rock carvings at Balparana.

PLATE II.

Rock carvings at Wilkindinna.

PLATE III.

Fig. 1.—Deception Creek (Red Gorge).

Fig. 2.—Deception Creek East: escarpment of limestone bearing numerous carvings.

PLATES IV–VIII, A.

Rock carvings in Deception Creek (Red Gorge).

PLATES VIII, B–X, B.

Rock carvings in Deception Creek East.

PLATE XI.

Fig. 1.—Oratunga Creek.

Fig. 2.—Yunta Springs.

PLATE XII, A.

Rock carvings in Oratunga Creek.

PLATES XII, B–XIV, A.

Rock carvings at Yunta Springs.

PLATE XV.

Fig. 1.—Mallett Springs.

PLATES XIV, B, XV (Fig. 2), AND XVI.

Rock carvings at Mallett Springs.

PLATE XVII.

Rock surface at Mallett Springs, showing grooves resulting from the sharpening of implements used in the production of the carvings described in this paper.

ON THE DISCOVERY OF A HUMAN SKELETON IN A BRICK-EARTH
DEPOSIT IN THE VALLEY OF THE RIVER MEDWAY
AT HALLING, KENT.

By W. H. Cook,

WITH AN ACCOUNT OF THE HUMAN REMAINS, BY ARTHUR KEITH, M.D.

(Read April 8th, 1913.)

WITH PLATES XVIII-XXII.

Introductory.—The site of the discovery is close to the railway station at Halling, a village situated on the west bank of the Medway about four miles above Rochester. Halling, as the map shows (Fig. 1), lies in the remarkable funnel-

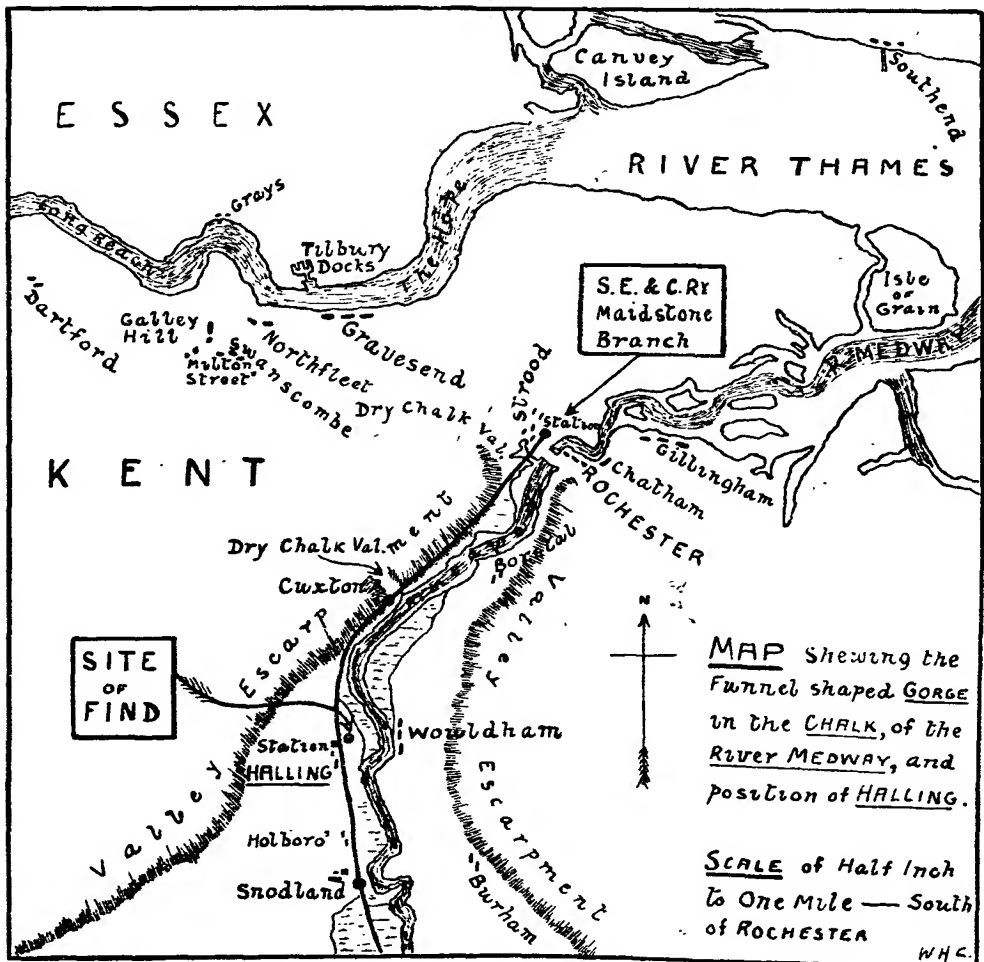


FIG. 1.—MAP SHOWING POSITION OF HALLING IN THE CHALK GORGE.

shaped gorge in the chalk through which the Medway flows in a northerly direction as far as Rochester, when it turns somewhat sharply eastward to join the Thames estuary. This gorge constitutes one of the four breaks which traverse the North Downs, and through which a great part of the waters of the Weald find their way into the sea. A stretch of marshland about 800 m. in width separates Halling

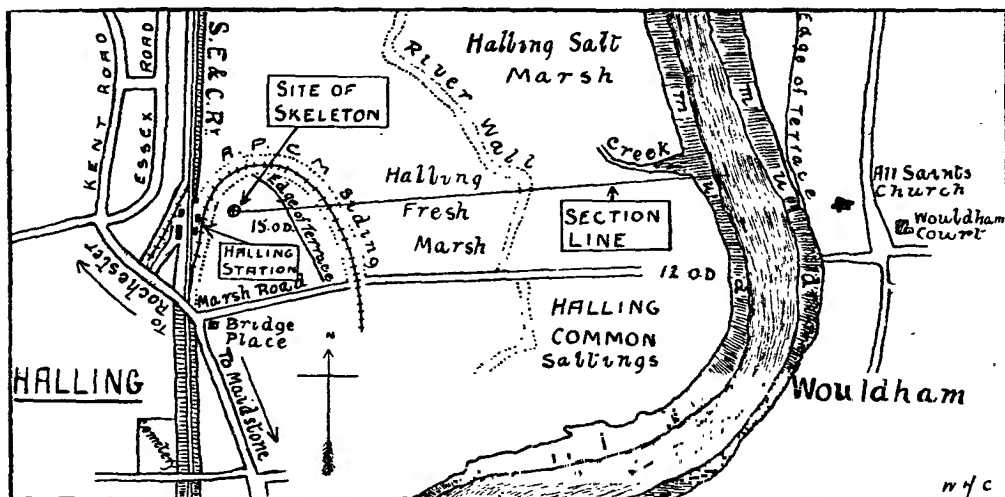


FIG. 2.—PLAN OF HALLING SHOWING SITE OF DISCOVERY.

from the Medway, which at this point is a tidal stream and about 36 m. in width at high water. A section across the marshland of the western bank—from the site of the discovery (see Fig. 2)—is shown in Fig. 3.

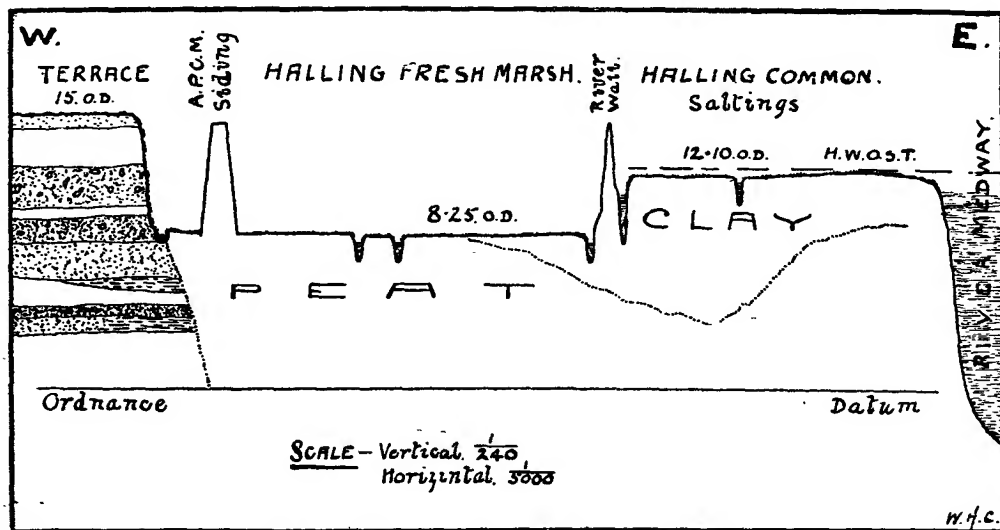


FIG. 3.—DIAGRAMMATIC SECTION FROM SITE OF DISCOVERY TO RIVER MEDWAY.
(Distance from edge of terrace to river, 604 metres.)

At the site of the discovery the land rises 15 feet above ordnance datum and is composed of strata of brick-earth. Then follows an area only 8 feet O.D., composed of peat and of later alluvial deposit, then a third area, flanking the river,

composed of holocene marsh clay, rising 12 feet O.D. It was in the deposit of brick-earth near the station that the human remains were discovered, at a depth of 190 cm. The deposit of brick-earth, as will be described in detail in Mr. Cook's part of this communication, was arranged in a series of superimposed strata. The human skeleton—or rather the remains of a skeleton—lay in the fifth stratum counting downwards from the superficial layer of humus.

At the junction of the fifth or skeleton-containing stratum and the overlying or fourth stratum, and at a short distance northward from the site of the skeleton were found the remains of a prehistoric fire-hearth. We infer that this junctional level represents an old land surface, and it is possible, we conceive, that the skeleton may represent an individual buried by those who lived on that old land surface. We have attempted, from the evidence produced later in this communication, to estimate the age of the old land surface. It most probably belongs to the later part of the Pleistocene period, but the final fixation of the age must depend on further investigations and discoveries.

We place all the facts on record in the hope that future discoveries will confirm and amplify the deductions we have drawn from the facts revealed by the excavations in the brick-earths at Halling.

In such an investigation as this the authors must become indebted for assistance to many men. In the present case full acknowledgment must be made of help received from the following gentlemen:—Mr. C. W. Andrews, B.A., D.Sc., F.R.S.; Mr. F. J. Bennett, F.G.S.; M. le Abbé Breuil; Mr. J. A. Bullbrook; A. Spencer-Edwards, M.B., C.M.; Rev. A. Irving, D.Sc., B.A.; Mr. A. Santer Kennard, F.G.S.; Mr. A. L. Cooper Reed, C.E., M.S.E.; Mr. R. Smith; Mr. Reginald Smith, B.A. F.S.A.; Mr. Spencer Sills, M.S.E., M.R.S.I.; W. Allen Sturge, M.V.O., M.D., F.R.C.P.; Mr. Hazzledine Warren, F.G.S.

PART I.

BY W. H. COOK.

The discovery.—On Tuesday, August 27th, of 1912, a land-slip—caused by the excessive rains—occurred on the south side of an excavation for a septic tank in connection with the sewerage works, then in the course of construction, at Halling. Soon after this took place the workmen were ordered to clear away the fallen mass, when it was seen that a human skeleton had been disclosed by the slip. Mr. A. L. Cooper Reed and Mr. R. Smith, the engineers in charge at the works, immediately informed A. Spencer-Edwards, M.B., of Halling, and myself of the occurrence, and accordingly Dr. Edwards and I at once went to the site to make the necessary observations for the placing on record of the facts relative to the find.

The limit of the slip occurred in close proximity to the skeleton, inasmuch that a few of the bones were contained in the fallen mass, and the remainder were left undisturbed *in situ*, thus enabling the exact position of the bones in the deposit to be determined beyond question. Measuring from the top of the humus to the

bones the least depth was 173 cm. and the greatest 190 cm. The position of the bones in the deposit was as follows :—

The trunk was supine north-west by south-east.

The skull rested tilted forward on the ribs to north-west.

Right femur, tibia and fibula and bones of right foot were in anatomical position with regard to each other, the limb lying stretched along the right side of the trunk but with the head of the femur close to the skull. The left-arm bones were under the thorax. The other bones were more or less in a confused mass below the thorax. The lower jaw was embedded among the ribs. The whole remains occupied a space of 95 cm. in length and about 16 cm. in depth.

Contained in the matrix surrounding the bones were—

A flint flake, 5·8 cm. in length, of fine workmanship; another flake having the natural cortex on one face.

A fragment of a calcined flint and some gastropod shells.

No bones other than human were found in the matrix.

As many of the bones as possible were removed undisturbed in the matrix, the whole being forwarded to Professor A. Keith for determination.

Geology of the discovery.—Owing to the limited time at his disposal Dr. Edwards requested me to undertake all further research in the matter, and in order to have another opinion, I called upon Mr. J. A. Bullbrook, of Rochester, who consented to assist me in working out the geology of the find.

The remains lay in a deposit forming a shelf, which represents there the remnant of a low terrace of the west bank of the Medway, and is situated at, or a little beyond, the extreme southern limit of the junction of a dry chalk valley running from south-west, and the valley of the Medway.

The deposit forming the shelf in which the human remains were found consists of various alternating beds of sand and brick-earth, distinctly stratified, some strata containing a large percentage of chalk pellets, some being very sandy with few flints and a little chalk, and the top stratum below the humus being almost entirely composed of clay containing very little chalk and no flints. (See Plate XXII.)

Following is an analysis of the drift at the site of the discovery as worked out by Mr. Bullbrook and myself :—

- No. 1, to the depth of 15 cm. humus, composed of a dark, loose, loamy soil, containing many angular flints, some greensand débris and eocene pebbles.
- No. 2, 61 cm. in depth, a dark red loam with excess of clay, immediately under the humus a few scattered flints, elsewhere none, and no chalk pellets, and no eocene pebbles.
- No. 3, 66 cm. in depth, buff coloured brick-earth containing many chalk pellets, a good number of large unbroken flints, many small angular flints, greensand débris, and some eocene pebbles.

Many of the large unbroken flints in this stratum were contained in a matrix of chalk made up of angular pellets in the form of a mosaic, in such a way that one can only infer that these flints were originally transported in their matrix of chalk, which has since commenced to disintegrate.

- No. 4, 15 cm. in depth, light buff coloured washed sand, contained no chalk pellets, very scarce flints, greensand débris, and eocene pebbles.
- No. 5, 40 cm. in depth, buff brick-earth somewhat mottled, containing some large flints as in No. 3 but fewer in number, a great number of chalk pellets, some greensand débris, small angular flints, and eocene pebbles.
- No. 6, 57 cm. in mean depth, light buff coloured brick-earth containing a number of small angular flints, some greensand débris, a great number of chalk pellets, and a few eocene pebbles.

This stratum expands somewhat towards the east at the expense of the stratum below.

- No. 7, 50 cm. in mean depth, light brown sand, no chalk pellets, scarce angular flints, greensand débris and eocene pebbles.

This stratum thins somewhat towards the east.

- No. 8, 30 cm. in depth, a pebbly drift composed of chalk pellets, with scattered angular flints, greensand débris, and eocene pebbles.
- No. 9, depth unknown, light brown washed sand, scarce greensand débris, small angular flints, and eocene pebbles.

At the eastern end of the excavation at Halling a strong spring of water bubbles up at about 2 feet O.D., carrying with it much running sand.

REPORT ON THE MOLLUSCA. BY A. SANTER KENNARD, F.G.S.

From Skeleton Stratum.

Vitrea Nitidula (Drap.).
Hygromia hispida (Linn.).
Helix nemoralis (Linn.).
Pomatias elegans (Mull.).
Helicigona Lapicida (Linn.).

From Stream Channel above Skeleton.

Arion ater (Linn.).
Pyramidula rotundata (Mull.).
Hygromia hispida (Linn.).
Helix nemoralis (Linn.).
Pomatias elegans (Mull.).

"Though the species are almost identical, yet there is considerable difference in their condition. Those from the lower bed are very fragile and fall to pieces when

the material is unmasked, whilst those from the upper stratum are better preserved, though even these are not so well preserved as the shells in the various holocene rain washes in the neighbourhood. There is no characteristic species to determine the age of these beds, but in all probability they are late Pleistocene."

Returning to stratum No. 2—for some distance overlying either side of the skeleton this stratum cuts into the one immediately below it to within 10 cm. of the latter's entire depth, forming a sharp depression 65 cm. deep and 335 cm. long, entirely filled up with the same deposit as that shown in the rest of the stratum above—No. 2. This deposit is almost entirely made up of deeply iron-stained hydrous silicates—mostly those of aluminium—in a very fine state of division, containing a minute percentage of free silica in the form of quartz grains, and a very little chalk, this also being finely divided and entirely inappreciable to the naked eye. Percentage analyses of this stratum with the three below are given hereafter in a comparative table. It is noteworthy that, with the exception of some 20 cm. at the base of this depression, there are no flints of any description other than a few scattered pebbles, either in the depression itself or in the stratum above, of which it is strictly a part, except at its junction with the humus. Spread over the bottom of the depression is a mass, 20 cm. in depth and 90 cm. in length, of large, angular, unworn, mostly unbroken flints.

These flints are identical in every respect with those found scattered quite regularly throughout its entire extent in stratum No. 3, through which the depression cuts; and many of the flints of which, therefore, are actually on a higher level than those found clustered in the bottom of the depression. It should be noted that while these flints are not found elsewhere in stratum No. 2, at the same time the cluster lies definitely in the bottom of the depression and is not to be mistaken for a portion of No. 3, where the matrix differs very considerably, and about 10 cm. of which can be traced indisputably between the mass of flints and the stratum of sand, No. 4, below.

Throughout the extent of the depression there is a vast number of shells of land mollusca of which the following species have been collected and identified:—

Arion ater,
Pyramidula rotundata,
Hygromia hispida,
Helix nemoralis,
Pomatias elegans.

As will be noticed in Mr. Kennard's report, although many of these shells are identical with those found at lower levels, their state of preservation is very much better than that of the latter, which would point to their belonging to a distinctly later period in time.

A few fragments of mammalian bones were also found in the depression, and again the mineral condition of these also differs considerably from that of the bones, whether human or otherwise, which were found at lower levels.

In the section at right angles to the face containing the skeleton is another exactly similar depression formed from the same level, cutting through the same stratum to almost the same level; containing within it a like mass of flints at its bottom; the same species of shells throughout, in the same mineral condition; and a mammalian bone again in a like mineral condition; in short, in every way identical with the depression just described.

The similarity between these two depressions, which extends even to their dimensions, leads one to suppose that each is a section of the same sinuous basin which has been cut through by an angle of the excavation.

Taking these facts into consideration, namely, the comparative sharpness of the depressions; the collections of stones at the bottoms identically similar with those found in the strata through which they cut; the congregation of shells throughout the deposit within them, with at the same time a complete absence of any shells on either side or above; the absence of chalk pellets; the scarcity of free silica; and the distinctly alluvial nature of the deposit, that being entirely such as one sees in slow running marsh streams to-day: there seems to me to be only one conclusion possible, and that is *that these depressions indicate a course of an old stream through a land surface at the top of stratum No. 3*, strikingly similar to the marsh streams so prevalent at the present day, and which has since become filled with alluvium, of which stratum No. 2 is but a continuation. It is important to note that the excavations revealed the continuation of the channel for a known distance of some 15 m.

It is interesting to compare stratum No. 3—into which the depression cuts; No. 4; and the skeleton-containing stratum No. 5. No. 3, a buff coloured brick-earth, is largely made up of silicates, and palpable silica in appreciable grains, while throughout its extent is scattered a large number of chalk pellets, many unbroken unworn flints, fresh as from the chalk—indeed many of them still in the chalk matrix—with a number of small angular flints, pebbles, and other *débris* indicating at the least a fair rush of water to have brought them down.

No. 4, on the other hand, contains no chalk pellets, although some little chalk is present in a very finely divided state, scarcely a single angular flint or pebble, very little clay indeed, and is mostly made up of free silica in the form of quartz grains, and the small black grains seen so abundantly in some of the Thanet sands. It is in fact most like a re-deposited Thanet sand.

In No. 5 we return somewhat to the condition of No. 3. Once more we have a brick-earth, now somewhat mottled with excess of iron staining, many large unbroken flints, although nothing like the number found in stratum No. 3, a great number of chalk pellets, and a quantity of smaller broken flints, pebbles, and chert.

Following is a table of percentages of silicates and free silica obtained by physical separation of the four strata in question, namely, the stream channel, and strata Nos. 3, 4, and 5 respectively, obtained from and immediately above the skeleton matrix:—

PHYSICAL PERCENTAGE ANALYSIS WITH THE CHALK EXTRACTED.¹

	Dip	Str. 3.	4	5
	per cent.	per cent.	per cent.	per cent.
Coarse sand	21	28	71	20
Medium sand	14	10	6	30
Fine „	25	34	17	32
Clay	40	28	6	18

There can be no question then, I think, that the deposits in and under which the remains were found are stratified.

Thus it is inconceivable that any disturbance has taken place in the strata since their original deposition, or that the remains are those from a comparatively recent burial, if indeed they indicate a burial at all.

36 m. northwards from the site of the skeleton, and lying strictly between the skeleton-containing stratum in No. 5, and the one immediately above in No. 4 (forming in fact a top sub-stratum of No. 5), is a black deposit 11 m. in length and of uncertain width, consisting of a matrix of brick-earth identical with the rest of the stratum; it is blackened by contained carbonaceous matter which is in no sense peaty, and contains some worked flint flakes, many nodules of flint showing evidence of intense heat, fragments of calcined bone and charcoal. It is therefore probably *the remains of a prehistoric fire-hearth, proving a land surface of human occupation at that particular stratigraphical level.* (See Plate XX.)

It should be noted that this level is exactly that immediately under which the skeleton was found.

Flint Implements.

All the flints discovered in stratum No. 5 which show human workmanship, consist of struck flakes and flake implements only, no implement in the general sense of the term having been found.

In mineral condition they chiefly exhibit a mottled bluish-white patina; a few that have been subjected to heat are of a white porcellaneous patination and occasionally a specimen is found but little altered from the time of its fabrication.

The specimens do not exhibit any signs of transportation, the edges being quite un-abraded except where apparently worn by use.

Though I have succeeded in finding a good number of specimens in the skeleton-containing stratum I think it is inadvisable at present to attempt to

¹ The chalk was extracted because of its masking the desired results.

assign them to any particular culture, more especially in the absence of the larger types of implements. Future research may perhaps result in the discovery of specimens that it may be permissible to place to a given period.

It is noteworthy, however, that many of the examples in the opinion of some of the highest authorities attune to the culture of the (so-called) cave period known as Aurignacian.

G.M.



FIG. 4.

Those having more marked characteristics are described and figured in the latter part of this paper. (See Plates XVIII, XIX, and XX.)

In stratum No. 2, immediately below the humus and vertically above the fire-hearth, and therefore stratigraphically above the flints just described from the skeleton-containing stratum, I found an implement 16·5 cm. in length, of pick-like form, comparing with types found at Campigny. (Fig. 4.)

No flints showing human workmanship were found in any of the other strata in the excavations.

Pottery.

The only pottery found was a few fragments lying on the top of stratum No. 2, immediately below the humus, and is probably of Celtic origin.

Age of the Deposit.

I now come to the question of the age—Geologic—of the deposit at Halling. Before any attempt can be made to estimate the probable age of the deposit in question, with its contained remains of man, it is necessary to consider its relationship to other deposits having like characteristics as revealed by sections exposed, at or about the same elevation, in the chalk gorge of the Medway. It must be borne in mind, however, that any estimate at the present juncture must of necessity be of a somewhat uncertain character.

As I stated earlier in this communication the deposit containing the human remains forms a shelf at about 16 feet O.D., and it represents there the remnant of a low terrace of the west bank of the Medway, built up of alternating strata of

brick-earth and sand. The continuation of this terrace may be traced along the west bank for at least a considerable distance in the area of the chalk, and is very marked between Halling and Strood.

On the east bank is another exactly similar terrace, formed at the same elevation above the river as the one just described, having the same general features, and extending almost unbroken between Burham Court farm, about a mile south of Wouldham, and Rochester.

By their uniformity in elevation above the river and like general features these terraces may be said to be paired. (See Plate XXI.) The deposits forming the terraces on either side of the valley are shown to be composed of intercalated beds of sand and brick-earth; they are sometimes capped by angular flint gravel, and appear to be resting on, or banked up against, the eroded slopes of the chalk from, or a little below O.D., to an elevation of some 50 feet above O.D. From this elevation the surface of the drift slopes towards the present stream, on either bank, to about 16 feet O.D., when it drops sharply on to the present saltings.

About $\frac{1}{4}$ mile south of Rochester Castle on the east bank, the river has cut back the terrace, leaving a section some 3 m. in depth exposed for some distance. Here the composition of the deposit is shown to be exactly similar to that at Halling. The brick-earth strata contains many pellets of chalk, small angular flints and some pebbles, alternating with strata of sand; in some of the strata large unbroken flints occur, whilst the whole is capped by a stratum of dark red clay.

In this section is also to be seen the probable former bed of an old stream, cutting through the strata below the red clay, being entirely filled in with the same material as that in the stratum immediately below the humus, and containing large numbers of shells of land mollusca. (See Plate XXI.)

It will be noticed that the geological features of the old stream channel just described are analogous with those of the old stream channel in the section at Halling, immediately under which the skeleton was discovered.

At Borstal fine sections have been exposed during the working of the beds comprising the terrace, for economic purpose. In these workings there appears to be an excess of sand containing many flints and pebbles, capped by an angular flint gravel towards the higher elevation, but nearer the river the exposures show the beds to be similar to those just described near Rochester.

Shells of land mollusca, as at Halling, occur here in some of the brick-earth strata, and I have also found struck flint flakes comparing with types found in stratum No. 5 in the Halling section. Remains of *Elephas primigenius*; *Rhinoceros tichorhinus*; *Cervus* and *Equus*, have been found from time to time by the workmen employed in these excavations.

In a disused tramway cutting, a little south of Borstal, is exposed a section showing the drift resting on the eroded chalk slope (Fig. 5). As will be seen

in the diagram the deposit thins out eastward, and finally disappears at an elevation of 50 feet O.D.

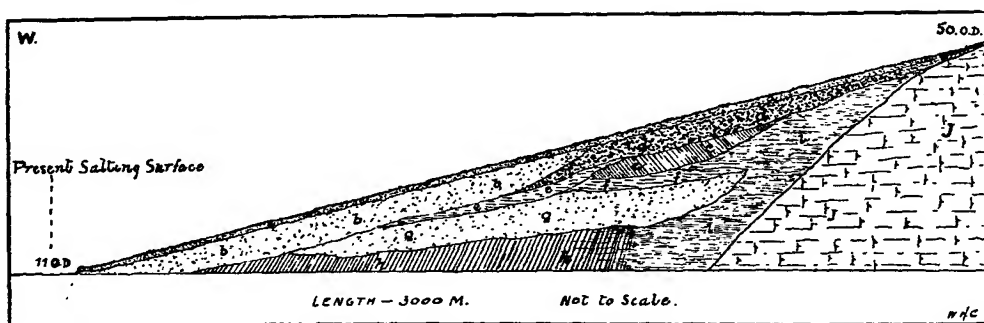


FIG. 5.—SECTION NEAR BORTAL, SHOWING DEPOSIT BANKED UP AGAINST THE ERODED SLOPE OF THE CHALK.

- (a) Dark red clay, immediately under the humus.
- (b) Buff brick-earth, with chalk pellets and small flints.
- (c) Sand.
- (d) Angular flint gravel.
- (e) Sand, merging into stiff clay.
- (f) Washed sand, with chalk pellets, under thin stratum of stiff clay.
- (g) Buff brick-earth, with chalk.
- (h) Sand, merging into—
- (i) Laminated sandy clay.
- (j) Chalk.

In the immediate vicinity of Wouldham Hall Cement Works the deposit has also been extensively worked for the obtaining of sand for building purposes. At this point the strata of sand and brick-earth is capped by a stratum of red ochreous angular flint gravel, the finer constituents of which are of a clayey nature. In the excavations here numerous mammalian remains have been found. Species represented in Mr. Bullbrook's, Dr. Edwards' and my own collections are: *E. primigenius*; *R. tichorhinus*; *Cervus*; *Bos*, and *Equus*, whilst numerous specimens may be seen in the museums of Maidstone and Rochester.

On the west bank at Strood, a little way south of the bridge, the drift comprising the terrace has been very extensively worked for the manufacture of bricks. In the sections exposed here the beds are shown to be very lenticular in places, though the general features, composition, etc., are the same as at Halling.

Shells of land mollusca occur in some of the strata, but I have not yet succeeded in finding any flints bearing human workmanship. It is now some years since these beds were being worked, thus, in the absence of any records, it is difficult to trace the identity of the mammalian remains that are known to have been unearthed during the excavations. It is quite certain, however, that *E. primigenius* was among the species represented.

At Martin Earle and Co.'s cement factory, and in an old tramway cutting a little southward of these works, sections are to be seen exposing the drift resting on the eroded chalk slope.

At Cuxton old brickfields the deposit is exposed showing the strata of brick-earth and sand capped by angular flint gravel, very similar to that described which overlies the sand at Wouldham Hall and Borstal. In the present river bed at Cuxton remains of *E. primigenius*, including a complete tusk, were dredged up a few years ago. In all probability these mammalian remains were washed out of the brick-earths at this point.

It will serve no purpose to weary the reader by describing in detail the almost numberless sections which are to be seen in the deposits forming the continuation of the terraces below Rochester, and occur more especially in the stretch between Gillingham, and near the mouth of the river, on the right bank.

In the district in question the beds in some places have been worked from, probably, pre-Roman times, certainly during and since the Roman occupation, for the manufacture of pottery and bricks, and to-day brickyards abound.

The general features of these deposits are common with those of the deposits above Rochester, and remains of *E. primigenius*, *R. tichorhinus* together with the remains of other departed members of Pleistocene fauna, are not uncommon there.

It is conclusive, therefore, from the foregoing evidence, that the deposit at Halling containing the human remains is not a lenticular bed of drift of a purely local occurrence, but is part of the formation of superimposed beds of brick-earth and sand comprising the low terrace of the Medway, the whole character of which appears to be uniform throughout the valley below the greensand gorge.

Again, it is reasonable to infer, by the evidence given in the report on the geology of the discovery, that the human remains are at least as old as the deposit in which they were contained.

In a deposit composed of alternating strata of sand and brick-earth, such as that which occurs at Halling, any disturbance that would have taken place in the case of a comparatively recent interment, must have been disclosed by the breaking of the continuity of stratification of the beds in and immediately under which the remains were discovered. Unfortunately, little research appears to have been carried out in the past with regard to the geology of these deposits, consequently materials for deduction are meagre. I think, however, that what evidence we have in regard to the character and position of these deposits, consisting as they do chiefly of brick-earth and sand resting on the eroded slopes of the chalk, the elevation at which they are situated affording proof that the base level of erosion was, at the time of the deposition of the drifts, higher in relation to the land than at the present time; the contained fauna together with the mineral condition of the shells, as shown in Mr. Kennard's report on the mollusca, fully justifies the conclusion that *the beds comprised in the low terraces of the Medway are pre-Holocene in geologic age.*

It may, perhaps, be assumed by some, that the remains of the now extinct mammals occur in these deposits as derivatives of older drifts, and are not contemporaneous with the formation of these beds. It is difficult, however, to

conceive that such heavy objects as the tusks and limb-bones of the mammoth could have been transported from other beds at a higher level, some distance away, by the agency of water having a comparatively quiet flow, such as must of necessity have been the case to have brought about the deposition of beds composed of fine matter, as are brick-earth and sand, in which these remains have been discovered.

Question of Interment.

Whether the human remains represent those of a burial at an early date, or whether they became embedded in the deposit by natural agency, is a question that calls for some attention.

If the remains are those of an individual who lived on the old land surface, the stratigraphical level of which is some 30 cm. above the level at which they were found, and if we assume that at the early period with which we are dealing man had a respect for the dead; then the bones may be those of a human being buried in a shallow grave on the old land surface.

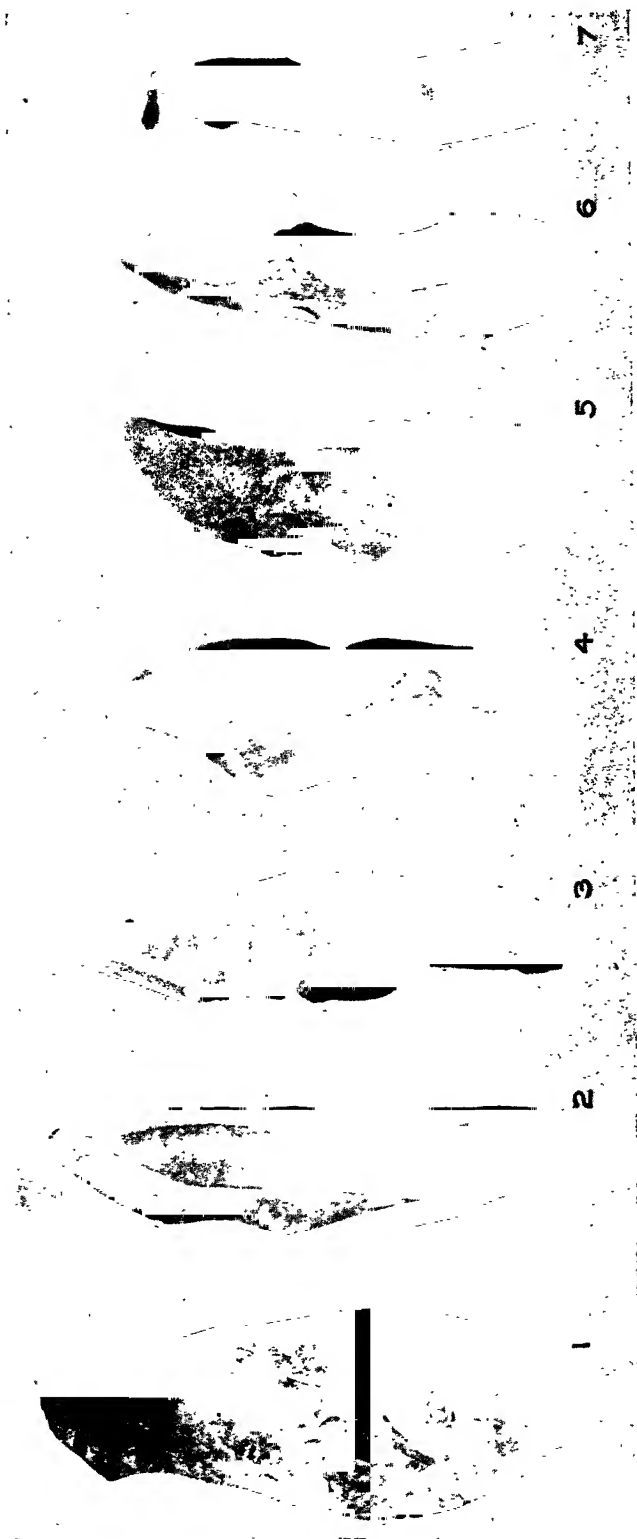
On the other hand, the position of some of the bones would seem to suggest that they had been disturbed after the softer parts of the body had disappeared, as, for instance, the position of the bones of the right leg and thigh, the head of the femur being beside the skull; also the lower jaw being embedded among the ribs.

This might be the case, supposing the body had been washed into a stream having a slow moving current, and becoming partially embedded in the deposit forming the stream bed. After the decay of the softer parts, the bones would then probably be subjected to movement in times of flood, insomuch that they would keep together as a whole, whilst some might become shifted from their original anatomical position, until the whole was entirely covered by the deposit. However, this is a question for those more able than I to deal with.

It may perhaps be thought that the question of the geological age of the remains might have been treated at greater length, but it would be premature to speculate at all in that direction at present. A great amount of research work lies before us before any finality can be arrived at with regard to the exact division of the Pleistocene period to which the deposits may be assigned. My purpose in the writing of this paper has been to place on record the facts in connection with the discovery at Halling as they have occurred to me.

REFERENCES.

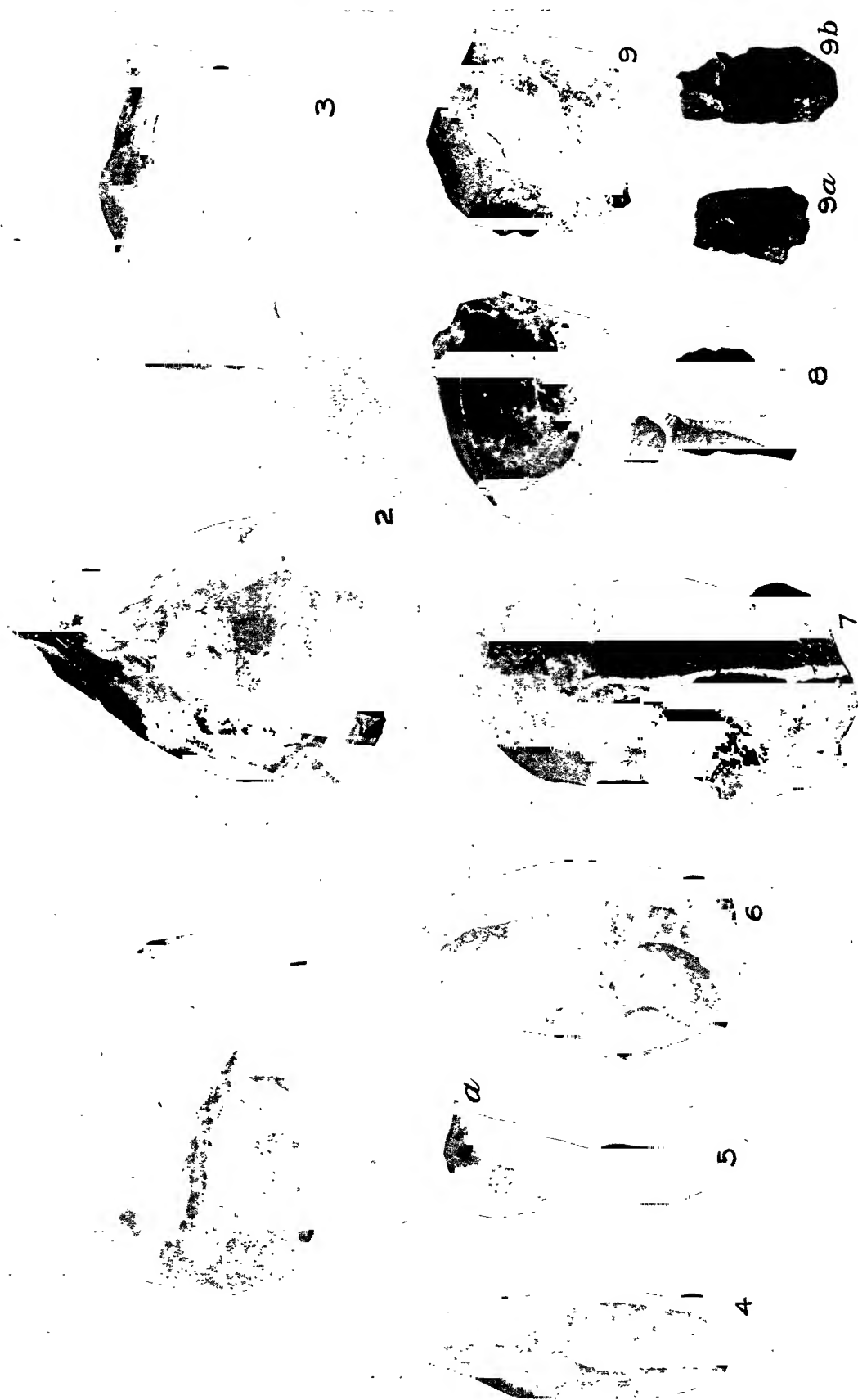
- Maps.*—Ordnance Survey, Geological. Sheets 20 with 24. Drift or solid, 2s. 6d.
 Ordnance Survey. 1-inch. Sheet 117, 2s.
 Ordnance Survey, 6-inch. Sheets XVIII, S.E., XIX, S.W. Kent. 1s. each.
- Literature.*—Bennett, F. J., "Ightham, the story of a Kentish village," *Homeland Assoc.*, 5s.
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FLINT IMPLEMENTS FROM THE SKELETON-CONTAINING STRATUM—NO. 5. NOS. 1-4, LONG NARROW FLAKES WITH THE "COUP-DE-BURIN."
SCALE—SLIGHTLY REDUCED.



"MIDGETS" FROM THE SKELETON-CONTAINING STRATUM—NO. 5. SCALE $\frac{1}{2}$ (FOR DESCRIPTION SEE TEXT).



FLINT IMPLEMENTS FROM THE SKELETON-CONTAINING STRATUM—NO. 5 (FOR DESCRIPTION SEE TEXT). SCALE—SLIGHTLY REDUCED.

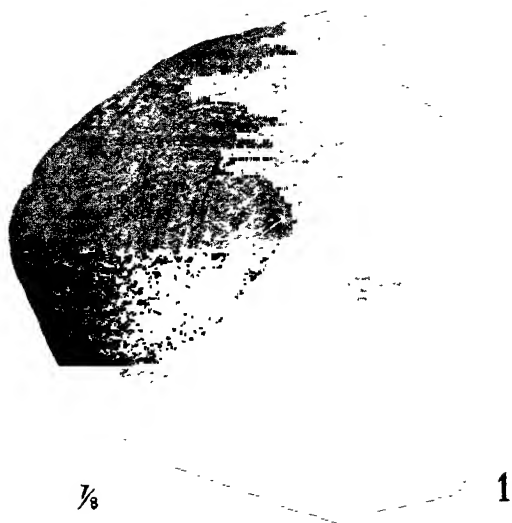


FIG. 1.—STRUCK FLINT FLAKE FOUND EMBEDDED AMONG THE BONES IN THE MATRIX SURROUNDING THE SKELETON (FOR DESCRIPTION SEE TEXT).

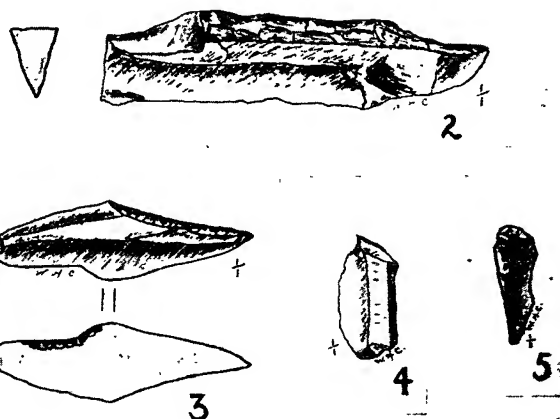


FIG. 2.—FLINT FLAKES FROM STRATUM NO. 2 IMMEDIATELY BELOW THE HUMUS (FOR DESCRIPTION SEE TEXT).



FIG. 3.—SECTION OF FIRE-HEARTH AT THE JUNCTION OF STRATA 4 AND 5 (FOR DESCRIPTION SEE TEXT).



FIG. 1.—VIEW OF LOWER TERRACE ON THE WEST BANK AT THE SITE OF THE DISCOVERY, SHOWING THE DEPOSIT ENDING ABRUPTLY (1) AND DROPPING SHARPLY IN CLIFF-LIKE FORM ON TO THE PRESENT SALTING SURFACE (2).

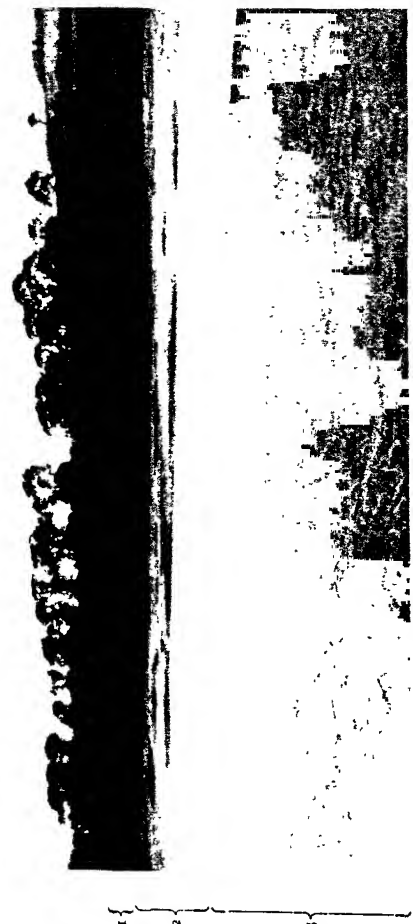


FIG. 2.—VIEW OF LOWER TERRACE ON THE EAST BANK, DIRECTLY OPPOSITE HALLING, SHOWING THE DEPOSIT ENDING ABRUPTLY AND DROPPING SHARPLY ON TO THE PRESENT SALTINGS (1). (2) RIVER MEDWAY. (3) SALTINGS ON WEST BANK.

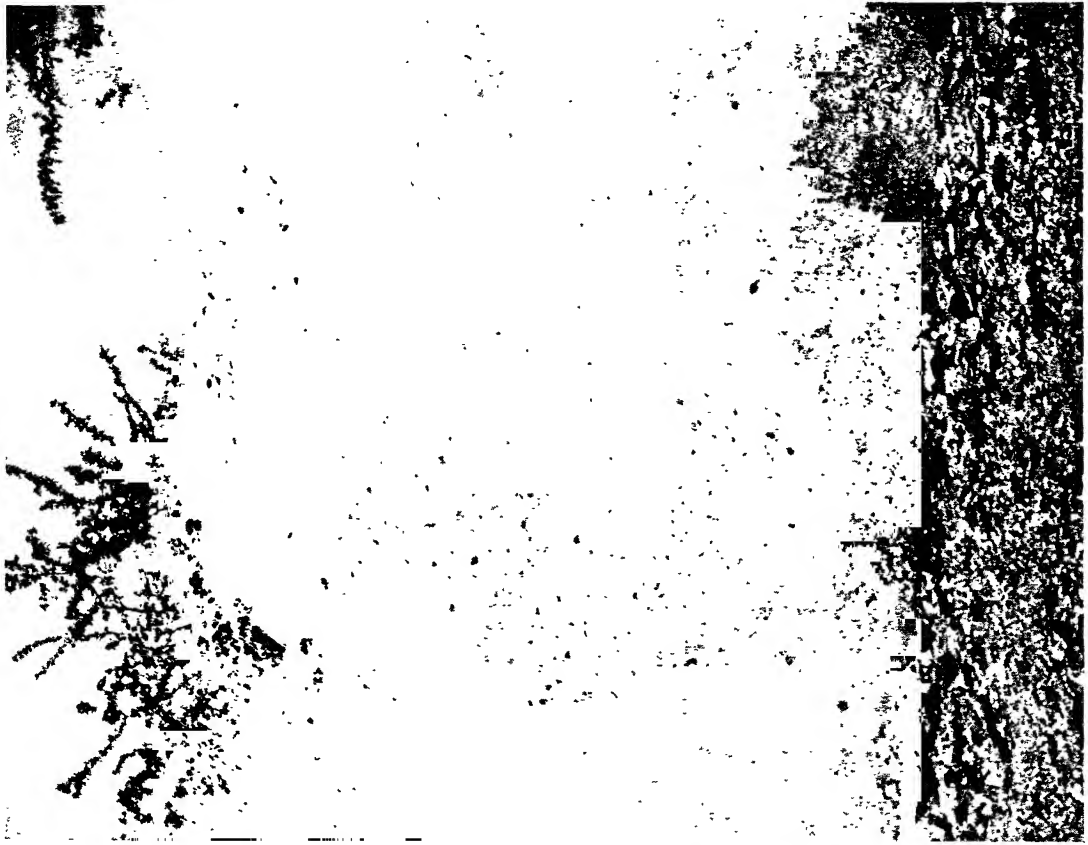
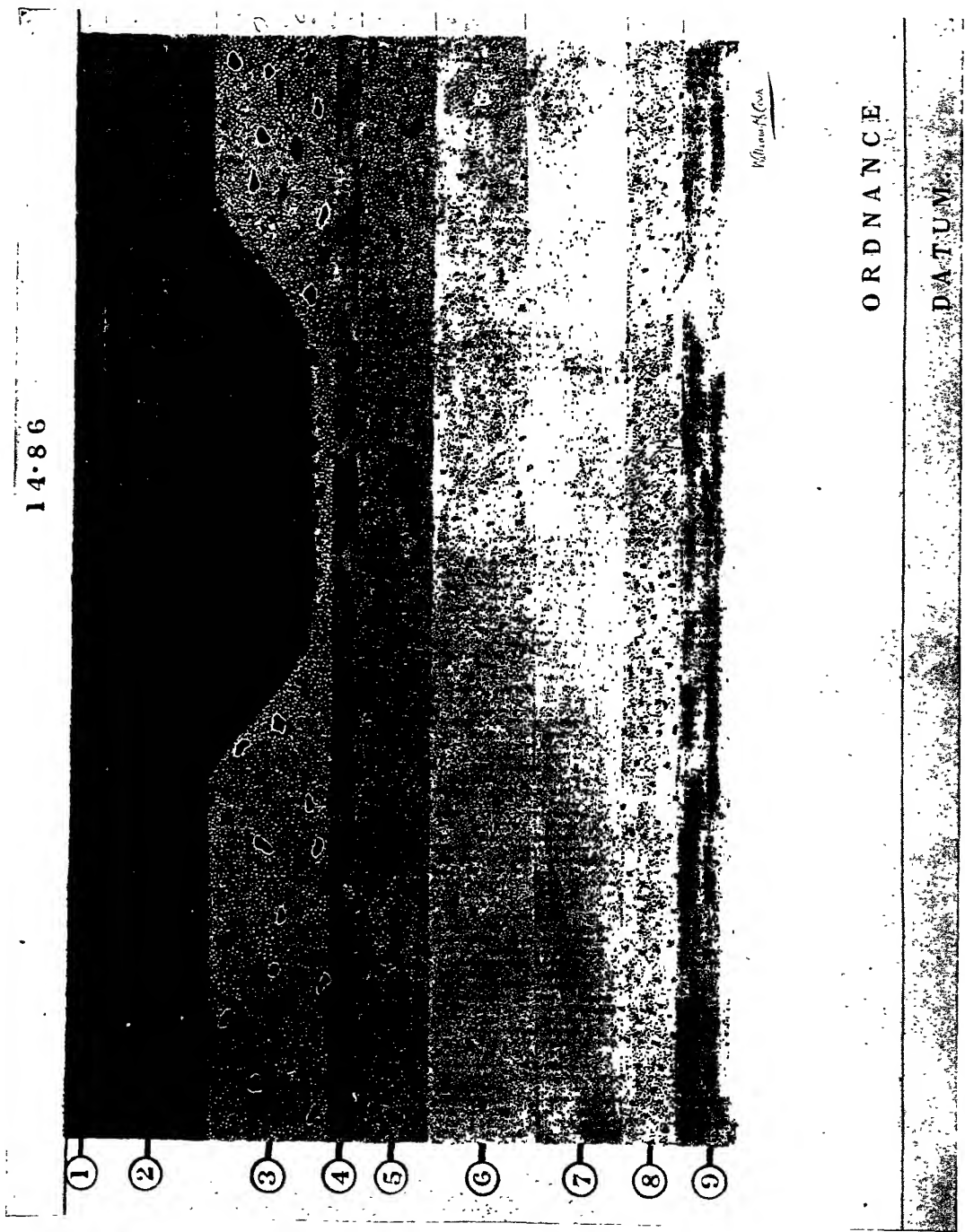


FIG. 3.—SECTION NEAR ROCHESTER, SHOWING OLD STREAM CHANNEL. (SEE TEXT.)



DIAGRAMMATIC SECTION OF THE DEPOSIT AT THE SITE OF THE DISCOVERY—REDUCED FROM COLOURED DRAWING BY THE
AUTHOR AND VERIFIED BY MR. J. A. BULLBROOK AND A. SPENCER EDWARDS, ESQ., M.B. (See p. 215.)

- Kennard, A. S., "On Non-marine Mollusca from an Early Neolithic Interment at Cuxton, Kent," *Proc. Malacological Soc.*, vol. viii, part 6, Sept., 1909.
- Whittaker, W., "Memoir, Geological Survey," *Geology of the London Basin*, vol. iv, part i, 1872.
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DESCRIPTION OF PLATES.

PLATE XVIII.

Implements from the skeleton-containing stratum—No. 5.

- No. 1—Flake 7.3 cm. in length, having a mottled bluish-brown patina. This example has the "coup-de-burin" well marked.
- The arête between the burin flake surface and the main upper surface of the flint exhibits the "smashing" which is a feature in continental cave pieces of this kind.
- No. 2—A narrow flake with mottled bluish-white patina, 7.2 cm. in length.
- The end opposite to the bulb of percussion shows secondary flaking producing a typical "burin."
- No. 3—A narrow flake 6.9 cm. in length, having a beautiful ivory-white patina. This example has much secondary flaking at the bulbar end, producing a round scraping edge, the opposite end being trimmed to produce a chisel edge at right angles to the plane of the faces. It is in every way identical with many examples of graving tools from continental caves of Aurignacian age.
- No. 4—A flake 6.2 cm. in length, of bluish patina. The "coup-de-burin" is observable at the top end.
- No. 5—Long narrow flake with light blue patina, 6.2 cm. in length.
- No. 6—Ditto.
- No. 7—Ditto, 5.6 cm. in length.
- Nos. 8-12—"Midgets," all exhibiting fine secondary flaking round the edges. Dr. Allen Sturge says of No. 10:—"A charming little midget, *not* of the Indo-Scunthorpe series, but very suggestive of French cave pieces. I have almost identical ones from the mid-Aurignacian caves (Barma Grande) of Mentone. The 'little handle' seems to be connected with the so-called early 'pointe-à-cran,' so well known as occurring in those caves."

PLATE XIX.

Implements from the skeleton-containing stratum—No. 5.

- No. 1—Flake 6.4 cm. long, 3.8 cm. wide, of greenish-blue patina. It is trimmed at a very acute angle on the upper face, producing a curved cutting or scraping edge. Opposite to this edge a part of the original crust of the flint is left, perhaps to facilitate the hand grip.
- No. 2—A cone-shaped implement 4.6 cm. × 4 cm. across the base and 6 cm. in height, having a mottled bluish-white patina. This specimen much resembles that figured by Mr. Reginald Smith* as a cone-shaped plane (grattoir Tarté), Aurignac stage.

* "The Classification of Stone Implements," *Proc. Geol. Assoc.*, Vol. xxiii, Part 3, 1912.

- No. 3—Flake 5.6 cm. \times 3.7 cm., blackish-blue patina, having a finely chipped curved edge on one side, the opposite side being somewhat blunted. The end opposite to the bulb of percussion is bevelled chiselwise and a fabricated, handle-like knob projects at the butt end.
- No. 4—A thin symmetrical flake 5.8 cm. in length, of bluish-white patina, exhibiting no secondary trimming, but is apparently worn by use at the point.
This specimen was found embedded among the bones in the matrix surrounding the skeleton.
- No. 5—A flake 4.8 cm. in length, of bluish patina, having a fine point worked at one end—marked "A."
- No. 6—A flake 5.8 cm. in length, of greenish-blue patina, broken at the end opposite to the bulb of percussion, the transverse section being trimmed by fine secondary flaking.
- No. 7—A thick implement with flat underface; 7.2 cm. in length, of greenish-blue patina. The top end and part of one side is finely trimmed, the natural crust having been left on the opposite side.
- No. 8—A flake 7 cm. in length, 4 cm. at the widest part, of bluish-white patina, trimmed to produce a spatula-like scraper. Running down the centre of the stone is a sharp ridge to within 25 mm. of the lower end. From this point a broad expansion has been produced by two flakes having been struck off transversely, and the edge being finished by fine secondary flaking.
- Nos. 9, 9A and 9B—Calcined flakes.

PLATE XX.

Fig. 1—Struck flake having the natural crust of the flint left on part of the upper face, no secondary flaking being observable.

It will be seen that a number of lines are scratched or engraved on the cortex and these have been considered by some authorities to be of human origin.

This example was found embedded among the bones in the matrix surrounding the skeleton.

Fig. 2.—*Flints from stratum No. 2 immediately below the humus.*

No. 2—A flake 4.9 cm. in length, almost unpatinated but with light blue shading in places.

One edge of the flake has been boldly flaked away, leaving a plain surface at right angles to the plane of the face of the flint. This example appears to simulate a type of "dos rabattu" knife which occurs in numbers in some of the French caves.

No. 3—A flake, mottled bluish-white patina, 33 mm. in length. Fine secondary flaking occurs on one side from the point to about half the entire length of the flint. On the opposite side reverse trimming occurs, forming a shoulder at about mid-way.

No. 4—"Midget" 11 mm. in length, unpatinated. It will be observed that a fine point has been produced at the top end of the flake by delicate secondary flaking.

No. 5—"Midget" 10 mm. in length, unpatinated. Secondary trimming occurs at the base.

Fig. 3—A photograph of a section of the fire-hearth which occurred at the junction of Strata 4 and 5.

Among the calcined nodules of flint will be noticed a struck flint flake just at the base of stratum 4, immediately above which occurs a calcined bone.

PLATE XXI.

Fig. 1—A view of the lower terrace of the River Medway on the west bank at the site of the discovery, showing the deposit ending abruptly (1) and dropping sharply on to the present salting surface (2).

Fig. 2—A view of the lower terrace of the River Medway on the east bank directly opposite Halling, showing the deposit ending abruptly and dropping, in cliff-like form, on to the present salting surface (1).

2. The River Medway.

3. Saltings on the west bank.

Fig. 3—Section near Rochester showing an old stream channel.

1. Humus.

2. Dark red clay.

3. Brick-earth and sand.

4. River beach.

It will be observed that the channel cuts through the brick-earth and sand strata to almost the level of the river beach, and is filled up entirely with the same material which forms stratum No. 2—the red clay—immediately below the humus.

PLATE XXII.

See pp. 215–6.

PART II.

REPORT ON THE HUMAN AND ANIMAL REMAINS FOUND AT
HALLING, KENT.

BY ARTHUR KEITH, M.D.

Position of the Skeleton.

In Fig. 1 is shown a reconstruction of the position of the parts of the skeleton, the diagram being founded on the observations of Dr. Spencer-Edwards, who saw certain parts *in situ*, and gathered evidence regarding the position of the other parts. The skeleton lay on its back with the head directed towards the north-east, and the pelvic part towards the south-west. It was also slightly turned on the left side with the right arm bent over the region of the breast and the left extended

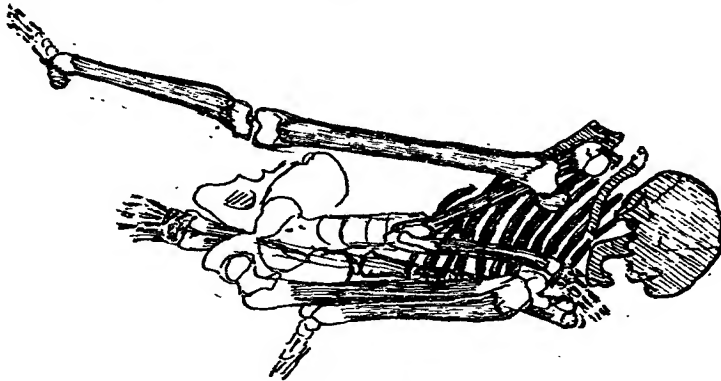


FIG. 1.—SKETCH OF POSITION OF PARTS FROM OBSERVATIONS MADE BY DR. SPENCER-EDWARDS.

underneath. The thighs, one infers from the position of the tibia and scapula, must have been flexed on the trunk. The right tibia and right scapula, which Dr. Edwards saw *in situ*, were relatively so close together that their approximation can only be explained by supposing the body to have been in a contracted position at the time of death. Dr. Edwards gives the following account of the discovery of the skeleton:—

“I saw a part of the skeleton (the right tibia, right scapula, and fragments of ribs) *in situ*, undisturbed, in the bank after a fall of earth had first exposed and loosened and caused to fall the greater part of the skeleton. The lower end of the

tibia pointed to the south-west; the upper to the north-east; the right scapula, the inner surface of which was exposed on the bank, was to north-east of the upper end of the tibia and about a foot and a half (45 cm.) away from it. The upper end of the tibia lay at a slightly higher level than the lower. I questioned the foreman who was present during the fall of earth, and he told me that the head showed first and that he caught it in his hands as it loosened and fell. Then the mass of earth containing ribs and arm bones fell. My enquiries show that all the bones lay within a space of 3 feet (90 cm.) and that the skeleton lay on its back with the right side a little higher than the left. The femur seems to have been pushed up beside the trunk. One arm, the left, lay behind the back or rather below the other bones, and one, the right, was across the chest and flexed at the elbow. The skull was bent over the chest, the lower jaw being pushed amongst the upper ribs. I saw the skull and cranial cast removed from the mass of earth in which they lay. The skull was compressed laterally, the frontal and parietal bones being much cracked and peeling off the cranial cast. The left side of the forehead was pushed back; the upper jaw and nasal bones were not in position. The bones were soft and friable, but became much harder as they dried. There was a curious hollow in the cranial cast over the outer side of the right orbit and under the frontal bone, which looked to me as if caused by an air space, the space being bridged over by the broken frontal bone. The surface of the cranial cast showed traces of root penetration.

"I am perfectly sure that the earth over the remains had not been disturbed. The remains lay in a sort of stratified deposit, and the deposits over the remains showed an undisturbed stratification. I am quite sure that this was not a burial. The bones lay in fine brick-earth and a fine flint flake was found immediately above the remains."

Is it a Burial or a Natural Inhumation?

Mr. Cook has described the strata overlying the remains and the depth at which they were found—namely, between 5 feet 9 inches and 6 feet 2 inches (1,730 and 1,920 mm.). The depth and the unbroken stratified lines over the remains exclude the possibility of a burial from the present land surface. It is reasonable to presume that when a complete skeleton—and in this case there were fragmentary representatives of all parts of the skeleton—is found, especially in the contracted posture, that the body has been deliberately buried. From a medico-legal point of view, as I pointed out when dealing with the Ipswich skeleton, it is possible for a person to die in and retain the contracted posture and to be overwhelmed or submerged in that posture, but the conditions under which such a natural inhumation could occur are so uncommon that they need only be considered in cases where one may presume such favourable conditions were present. A contracted posture and the presence of a complete skeleton—except in estuarine, deep river or bog deposits—usually signify a burial. In the present case remains of hearths and of human occupation were found at the upper level of the stratum

in which the remains were embedded. The hearths indicate an old land surface—now covered by three or four more recent strata, amounting to about 5 feet in depth. We may infer in the present case that the Halling remains are those of a man buried when the level of the hearths was a land surface. How long ago that is must be determined by geologists and by those who have studied the formation of the deposits.

The condition of the bones does not help us greatly in determining the age. The tibia of a rhinoceros from a brick-earth deposit regarded as of the same age as the formation at Halling, shows a state of preservation similar to that of the human skeleton. They are not mineralized to the extent seen in early Pleistocene bones. They are brittle, brown in colour on the surface, but when broken across the interior is grey and chalky in appearance and texture. When one applies the tongue to the broken surface, it adheres. The bone contains so little animal matter that when placed in a weak solution of HCl it crumbles away, leaving no gelatinous outline of the fragment behind. The fragments of the skeleton give a metallic resonance when struck. The animal bones from the strata at Halling are in three conditions: (1) some are brown in colour and very slightly mineralized; (2) others are grey, hard and mineralized to the same extent as the skeleton; (3) one—the radius of a rhinoceros—is deeply mineralized and is presumably a re-deposit from an older stratum. No grave furniture of any kind was found. A fine flint flake was found with the skeleton.

One other point may prove of some assistance in fixing the age. The material in which the ribs are embedded is typical of the stratum in which the skeleton was embedded—the stratum No. 5, described by Mr. Cook. The skull was almost completely filled with a brick-earth, which is similar to that in which the ribs are embedded, except that it contains very little and only fine grains of chalk. We may presume that the skull was filled from the stratum in which the body was buried, by two agencies: (1) the percolation of rain and water which carried in the finer surrounding grains from the brick-earth as the brain decayed, and before the skull walls yielded to the pressure of the overlying layer, and (2) by the agency of worms and worm casts. The matrix of the brain cast is such as we might expect to be formed from the stratum in which the skeleton lay. Apparently the cranial cavity was not quite filled. Dr. Edwards observed a space under the right frontal region, which was evidently the highest or most superficial part of the skull. There was no mark of cutting or of injury on the bones.

Sex, Age, Stature.

There is no doubt as to sex; the massive size of the head of the thigh-bone (diameter 50 by 49 mm.), the strongly developed limb-bones, the fragments of the pelvis and the characters of the skull leave us in no doubt that it is the skeleton of an adult man. The teeth are so worn that the dentine is widely exposed on the grinding surfaces, and many are lost by disease. From the wear of the teeth we

infer that he must be at least thirty years of age or more. The sutures of the skull are unclosed; we may infer from their open condition and the thinness of the cranial bones that he was under forty years of age. He was probably between thirty and forty. None of the limb-bones are complete, but there is sufficient of both thigh bones to estimate that their original length was approximately 435 mm. That measurement, by Professor Pearson's formula, yields a stature of 1,630 mm. or 5 feet 4 inches. The femur of Jonathan Wilde—a notorious English criminal hanged in 1725—has a length of 447 mm.; the stature of the skeleton is 1,632 mm. (5 feet 4·2 inches). The Halling man was thus slightly shorter than Jonathan Wilde and had stronger bones and a more muscular development.

Cranial Characters.

Even after all the fragments had been fitted into their appropriate places, it was found that not one single bone was absolutely complete. The cancellous bone had crumbled away, only the denser parts being preserved. At first it seemed unlikely that any definite information could be obtained from the cranial fragments. The cranial cast was flattened from side to side, but when the fragments of the skull were fitted together it was seen that they had not undergone any deformation with the compression of the cranial cast. It was impossible—

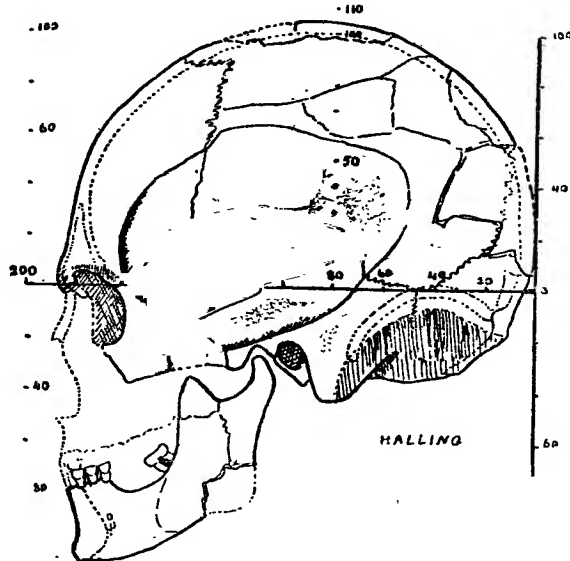


FIG. 2.—PROFILE DRAWING OF THE HALLING SKULL. ($\frac{1}{8}$ NATURAL SIZE.)
The attachment to the neck is shaded; the position of the lateral sinus is indicated.
The frontal sinus is shown by stippling.

owing to the fragmentary nature of the skull—to measure the capacity of the cranial cavity by direct means, but by employing the formula given by Professor Pearson the brain capacity was estimated to be 1,510 c.c.—20 or 30 c.c. above the mean of modern Englishmen and especially high when one remembers

the small stature of the individual. The capacity of the Tilbury man was about 60 c.c. less—1,450 c.c. The walls of the cranial cavity were of rather less than mean thickness—varying in the frontal and parietal bones from 4 to 5 mm., while in the Tilbury skull the corresponding parts of the skull measure from 7 to 8 mm.

The general shape of the skull is seen from the three drawings—profile, full face and vertex (Figs. 2, 3, 4). The maximum length is approximately 187 mm.—the fractured state of the skull makes quite exact measurements impossible—its greatest width 142 mm.; the supra-auricular height 124 mm. The corresponding measurements of the Tilbury skull are: 188 mm., 142 mm., 118 mm.—the last being the only measurement showing a marked difference. In both skulls the length-breadth proportion or index is 75 (Halling), 75.5 (Tilbury). The length-

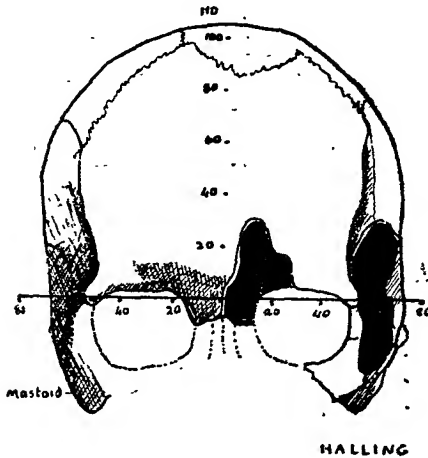


FIG. 3.—FRONTAL VIEW OF THE SKULL ORIENTATED ON THE PLANE SHOWN IN FIG. 2. ($\frac{1}{3}$ NATURAL SIZE.)

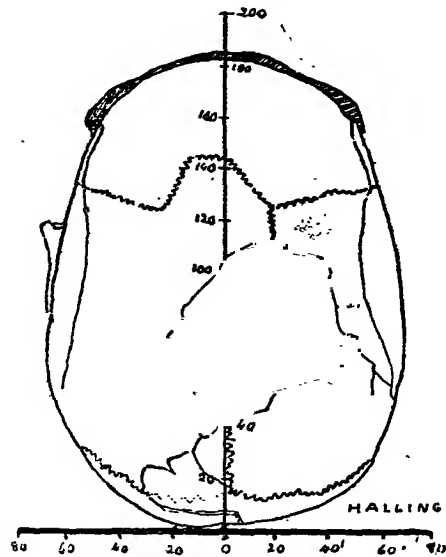


FIG. 4.—VERTEX VIEW OF THE SKULL. ($\frac{1}{3}$ NATURAL SIZE.)

height index in the Halling specimen is 66.3 per cent., in the Tilbury specimen 62.7 per cent. The capacity, the width and the height are greater than is usual in the "river-bed" type of skull, and yet in its general form there can be no hesitation in assigning the Halling skull to that type.

From Figs. 2, 3 and 4, it will be seen that there is an irregular formation of bones at the region of the bregma. The coronal suture makes a bend towards the forehead in this region, as if an os bregmaticum had been present, but it will be observed that the sagittal suture is apparent only at the right side of the position of such a Wormian bone. The irregularity is new to me. It is a remarkable fact that the crania from the megalithic monument at Coldrum, described in the last number of this Journal, also showed many irregular Wormian bones. Coldrum is only 5 miles distant from Halling.

Face and Mandible.

All that can be known of the face must be inferred from the conformation of the mandible, and from what remains of the supra-orbital parts of the frontal bone. The mandible suggests a face of less than moderate length, contracted in its lower part especially at the jowls or angular parts of the jaw. The chin is moderately developed, being narrow and peaked in shape; the height of the mandible at the symphysis is 30 mm.; its thickness 14 mm. The digastric impressions are ovate in shape, and with the other muscular markings of that region, show no departure from the corresponding parts of modern mandibles. The dimensions of the body of the jaw at the position of the 2nd molar were:—height, 23 mm.; thickness 14 mm.—slightly thicker than is common in the mandibles of Englishmen of to-day. The width between the angles of the lower jaw is estimated to have been 96 mm. against 102 mm. in the Tilbury man; the width between the condyles about

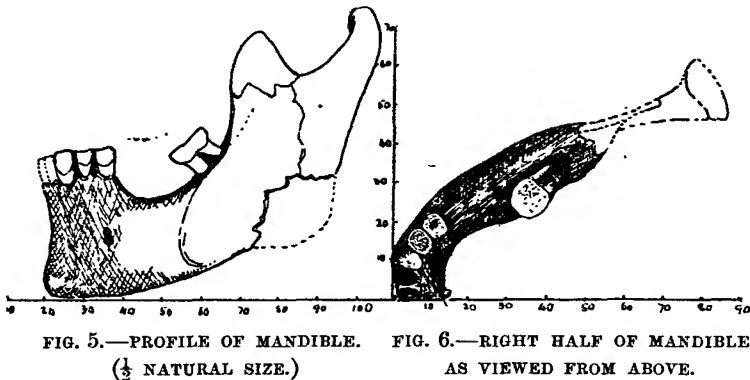


FIG. 5.—PROFILE OF MANDIBLE.
($\frac{1}{3}$ NATURAL SIZE.)

FIG. 6.—RIGHT HALF OF MANDIBLE
AS VIEWED FROM ABOVE.

120 mm. against 122 mm. in the Tilbury man. The height of the ascending ramus from the lower border of the insertion of the masseter, to the condyle, is 65 mm., the width of the ramus 30 mm.; both being very moderate dimensions.

It was not possible to make any accurate measurement of the extreme width of the face at the zygomatic arches; it probably did not exceed 140 mm.—about the same amount as in the Tilbury skull. The cheek bones were thus rather prominent.

The characters of the forehead are such as are often seen in modern men. As will be noted from the drawings of the three aspects of the skull, the supraciliary and supra-orbital ridges are but moderately developed—distinctly less pronounced than in the Tilbury man. The glabella is not prominent, nor was the root of the nose depressed; there was no distinct or well-marked notch at the nasion. The frontal sinuses ascended 50 mm. above the nasion, and measured about 14 mm. in their antero-posterior diameter. The thickness of the frontal bone from glabella to the anterior end of the olfactory plate was 20 mm. The minimum width of the frontal measures 100 mm.—the same as the Tilbury cranium; the width at the upper margin of the orbits—108 mm.—also the same as in the Tilbury skull.

The external angular processes of the frontal and the zygomatic arches were thus well-marked muscular processes. There is no evidence in mandible or teeth of any degree of prognathism.

Formation of the Skull.

The manner in which the skull was set on the neck is in complete agreement with what is seen in men of to-day. The mastoid processes show a moderate development (see Figs. 2 and 3) the bimastoid diameter of the skull, which may be regarded as an index of the width of the neck, is estimated to have been 120 mm.—a moderate amount. The muscular impressions of the occipital bone are marked much less strongly than in the Tilbury skull. This region of the skull is somewhat damaged, but it is certain that the inion was not produced into a strong or prominent process, and it was situated below the position of the internal inion. The neck was thus relatively slender and the head had a moderately marked backward projection, as is the case in crania of the "river-bed" type.

The Teeth.

The condition of the teeth is illustrated in the profile drawing of the mandible (Fig. 5); on the left side the first and second lower molars have been lost in life; on the right all three molars have been lost, and also the second premolar. Thus, although the man was probably under forty years of age, only the incisors, canines, first premolars, second premolar and third molar of the left side remained *in situ*. The teeth were worn down so that not more than half the crown remained. The dentition of the Tilbury man was equally affected by disease. In both of these ancient skulls the teeth were not lost through the modern disease of caries, but by exposure of the pulp cavities with the consequent formation of abscesses at the roots of the teeth. The condition of the upper jaw is unknown; only a fragment of the palate was recovered with three incisors and one molar. We may be certain that the upper teeth suffered from disease more than the lower. Thus, from the few examples known, we may infer that in late Paleolithic and early Neolithic times abscesses of the teeth were not uncommon.

As regards the size of the palate we must draw what inference is possible from the mandible. The dental arc was relatively small; from the outer or lingual border of the second molar of one side to the same border of the other there was a distance of about 64 mm. The front to back diameter of the lower dental arc, measured from a point between the position of the crowns of the mesial incisors to a point midway between the position of the posterior borders of the last molars, was 46 mm. These measurements differ very little from what is found in modern English mandibles; the width is rather greater, the antero-posterior diameter less. It will be noticed, too, that the third molar is set obliquely at the junction of the ramus and body of the jaw, showing that there was not sufficient room for the third molars.

As regards the size of the teeth, there is no point which calls for special remark. The lower incisors were not recovered. The crown of the lower canine measured 6 mm. (medio-distal) by 8.2 mm. (labiolingual). The first premolar 7.2×8 mm.; the second 6.8×8 mm. The crown of the third lower molar measured 10.6×10 mm. Only three upper teeth were recovered, two incisors and a second molar. The crown of the second molar measured 10×12 mm. All four cusps had evidently been present, but it is difficult to be certain of this because the dentine was exposed on the whole width of the crown. The roots of the molar were widely separated; they were short (15 mm.), and the height of the crown was 5.5 mm.—the total height of the tooth being 20.5 mm. The total height of the lower canine was 22 mm., on the anterior aspect of the root as a shallow longitudinal groove. Thus the outstanding feature of the teeth is the degree to which they had been worn, and the extent to which they had been lost by abscesses of the roots. As regards dimensions they were only of moderate size.

Bones of the Extremities and Trunk.

The various bones were compared with those of Jonathan Wilde (died 1725), who was of a similar stature—5 feet 4 inches. The clavicles were incomplete, but sufficient was found (see Fig. 7) to show that the total length was about 130 mm.—17 mm. shorter than in Wilde's skeleton. The inner or sternal part was flattened from

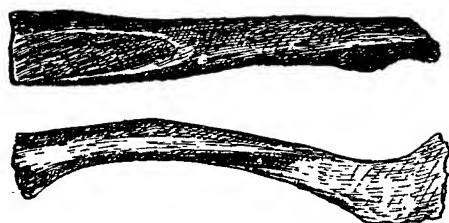


FIG. 7.—THE ANTERIOR AND LOWER ASPECTS OF THE LEFT CLAVICLE.
($\frac{1}{2}$ NATURAL SIZE.)

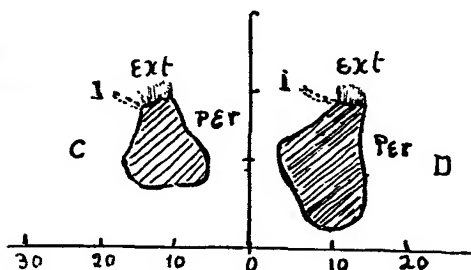
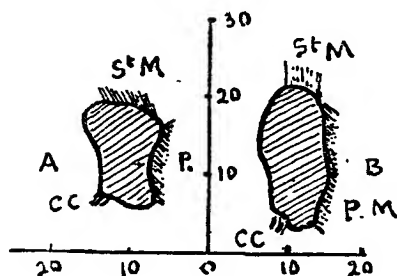


FIG. 8.—SECTION OF CLAVICLE NEAR ITS STERNAL END (B). THE CORRESPONDING SECTION OF JONATHAN WILDE'S CLAVICLE (A). ST. M = STERNO - MASTOID MUSCLE. SECTION OF THE RIGHT FIBULA NEAR ITS MIDDLE (D) COMPARED WITH SIMILAR SECTION OF FIBULA OF JONATHAN WILDE (C). EXT = EXTENSOR MUSCLE OF THE TOES. PER = PERONEAL MUSCLES.
(NATURAL SIZE.)

before backwards, more so than is usual in modern men. Transverse sections of the sternal part of the Halling and Wilde clavicles are shown in Fig. 8. In Wilde the vertical diameter was 13 mm., in the Halling skeleton 20 mm.; the front to back diameter was 11·5 mm. in the former, and 10 mm. in the latter. So short and strong a clavicle indicates a rounded strong chest. The right and left clavicles were of equal development. The scapula was too fragmentary to yield accurate measurement. Parts of both humeri were found; their length is estimated to have been about 310 mm., as against 328 mm. in J. Wilde, and 323 mm. in the Tilbury skeleton. The muscular development of the bone is very similar to that of the Tilbury specimen. At the deltoid impression the medio-lateral diameter is 20 mm. (20 mm. Tilbury, 21 mm. J. Wilde), and the dorso-ventral diameter 24 mm. (25·5 mm. Tilbury, 22 mm. J. Wilde). At the middle of the shaft the medio-lateral diameter was 20 mm., and the dorso-ventral 22 mm.—nearly the same as in the Tilbury. The Tilbury right humerus is distinctly better developed than the left, indicating specialization of the right arm, but in the Halling humerus the right is only slightly stouter than the left.

Only the carpal extremity was missing from the Halling radius of the right side; its total length was probably 235 mm.; 236 mm. in J. Wilde; 228 mm. in the Tilbury specimen. The radius of the Halling skeleton appears to have been relatively long. Its axis and curvature need no minute description. At the mid point the shaft of the Halling radius measured 16·2 mm. in its transverse diameter by 13·5 mm. in the dorso-ventral direction. The corresponding measurements in the Tilbury radius were 19 by 13·5 mm.; in J. Wilde's 13 by 11·5 mm. The carpal and metacarpal bones were short and stout. For instance, the width (medio-lateral diameter) of the articular surface of the proximal row of the wrist bones was 26·5 mm. in the Halling skeleton, by 12 mm. in the dorso-ventral diameter. The corresponding measurements in J. Wilde were 26 by 9·5 mm. The metacarpal of the thumb was 47 mm. long in the Halling specimen, 45 mm. in J. Wilde, but whereas in the former the diameters at the middle of the shaft were 14 by 9·5 mm., in the latter they were 11 by 9 mm. In all the bones of the hand the Halling man was of a clumsier and heavier make than the notorious thief-catcher J. Wilde.

As regards the bones of the lower extremity none were complete, yet sufficient was present in all to indicate the original measurements and characters. The bones appear stoutly built; the heads of the thigh bones are of more than moderate dimensions, being 51 by 49 mm., 3 or 4 mm. more than in the Tilbury specimen, or in J. Wilde. The oblique length was approximately 435 mm.; in J. Wilde 447 mm.; in Tilbury 446 mm. The upper third of the Halling femur is not flattened, in which it differs from the Tilbury femur, which is nearly as flat as is usually the case in Neolithic femora. Sections of the femur are shown in Fig. 9. The medio-lateral diameter in the Halling specimen is 32 by 28 mm. in its dorso-ventral diameter. The corresponding measurements in the Tilbury femur are 32 by 25·5 mm., the degree of flattening being more marked than in the Halling specimen. In the thigh bones of both skeletons the insertion of the gluteus maximus is indicated by a

long rough and irregular depression, with a gluteal tuberosity at its upper or proximal end. The middle of the shaft of the femur measures, in the Halling specimen, 26 mm. (medio-lateral) by 32 mm. (dorso-ventral). The corresponding measurements of the shaft of the Tilbury specimen are 28 by 33 mm. (right), 27.5 by 32 mm. (left); in J. Wilde, 27 by 28 mm. In prehistoric skeletons the middle part of the shaft of the femur appears as if it were compressed from side to side.

The extremities of both tibiae were missing. Their length is estimated to have been 345 mm., in Tilbury 345 mm., in J. Wilde 345 mm. Sections of the shaft of the tibia are shown in Fig. 9. There is no marked degree of side to side flattening. At the level of the nutrient foramen the diameters are 34 by 26.5 mm., at the middle of the shaft 28 by 24 mm. The right bone is slightly thicker and

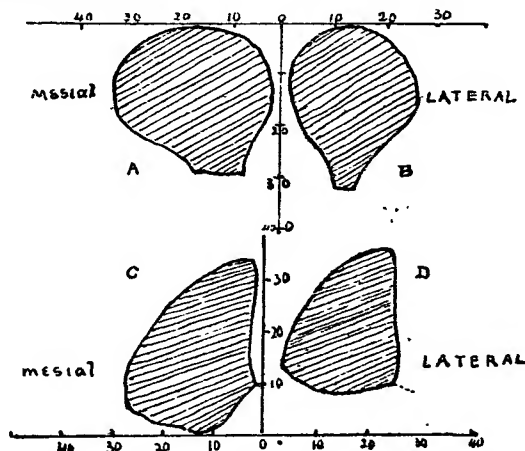


FIG. 9.—A. SECTION ACROSS UPPER THIRD OF HALLING FEMUR ($\frac{2}{3}$ NATURAL SIZE). B. SECTION ACROSS MIDDLE OF SHAFT. C. SECTION OF TIBIA AT LEVEL OF NUTRIENT FORAMEN. D. SECTION AT MIDDLE POINT OF SHAFT. ($\frac{2}{3}$ NATURAL SIZE.)

rather less flattened than the left. At the level of the nutrient foramen the diameters of the Tilbury tibia are: 40 (dorso-ventral) by 22 mm. (medio-lateral); in J. Wilde 39 by 24 mm. The Tilbury specimen shows a high degree of side to side flattening. Of the bones of the foot only the *os calcis* is sufficiently preserved for measurement. Its outstanding feature is the strength, breadth and prominence of the sustentaculum tale—for the support of the head of the astragalus. The extreme length of the *os calcis* is 80 mm. (73 mm. in J. Wilde); its width, from lateral border to inner margin of the sustentaculum is 47 mm. (38 mm. in J. Wilde); the vertical height of the heel 40 mm. Like the hand bones, those of the feet were massive and strong.

Fragments of the atlas and axis are preserved. They are of the same size and shape as the corresponding parts in J. Wilde, but more massive and strong.

Animal remains.

As already explained the animal remains showed three conditions of mineralization; the only ones which interest us here are those which were in a condition

corresponding to those of the human remains. One of these was the humerus of a small horse—probably of the size of an Exmoor pony—which was found in the stratum overlying that in which the human remains occurred (No. 3). It was submitted to Dr. A. Irving, who gave it as his opinion that without confirmatory evidence from the teeth and other bones of the skeleton, no definite statement could be made, but that it might be of Pleistocene age. "It seems to belong to a smaller type of horse altogether than the Remagen and other diluvial (Pleistocene) types whose remains have been described by Nehring. It was a more slender-limbed type than even the Stortford horse, with perhaps more of the Steppe race and less of the Plateau race of Professor Cossar Ewart" (*Quart. Rev.*, April, 1907). Dr. Irving has kindly given us the following comparative measurements of the humerus:—

Comparative Measurements of a Humerus of Horse from the Medway.

Received from Dr. Arthur Keith (Royal College of Surgeons), October 10th, 1912.

From the proportionate length (= that of a mare from Turkestan given by Nehring) it would appear to be a pretty full-grown foal with the skeleton imperfectly developed in *quantity* of bone.

Mare from <i>Turkestan.</i> Nehring.	"Stortford- Grimaldi" Horse.	Medway "Find."	—
mm.	mm.	mm.	
284	331	(broken)	Greatest length.
260	318	260	Length.
88	101	75	Greatest breadth
65	85	64	Breadth of "head" } upper.
76	86	72	Greatest breadth
70	82	(broken)	Breadth of "pulley" } lower.
33	42	31	Smallest diameter.
94	110	87	Thickness of upper knuckle portion.

A. IRVING.

Bishops Stortford,
October 10th, 1912.

The other remains were submitted to Mr. Charles Andrews, F.R.S., of the British Museum, who informed us that a species of *Bos* (*longifrons* ?) sheep or goat, Irish elk (*Cervus megaceros*) were represented, but that there was not a single representative of any animal which was certainly of Pleistocene date. The fauna found with the remains thus points to a late Paleolithic or Neolithic date.

Racial Characters.

Taking all the evidence into consideration we may presume that the Halling man represents a native of England towards the close of the Pleistocene period. It will be noted that neither the tibia nor the upper part of the femur show the marked flattening which so often characterises the bones of the lower limbs in Neolithic races. In this respect they resemble the limb-bones of modern men, but it has to be noted that flattening is absent in some continental skeletons of the latter part of the Pleistocene period. On the other hand the tibia and femur in the Tilbury man are distinctly of the Neolithic type. Indeed it may be said that the evidence of the skeleton—so far as its characters can be employed as evidence—is equivocal. There is no feature, either in limb-bones or in skull, which marks off the Halling individual from modern man. He is in every respect of the modern type.

There can be no doubt that in shape of head the Halling man belongs to that kind of man distinguished by Huxley as the "river-bed" type; Huxley's type specimen (the Trent skull, from an alluvial deposit in the valley of the Trent) is in the museum of the Royal College of Surgeons, and I take this opportunity of publishing three draw-

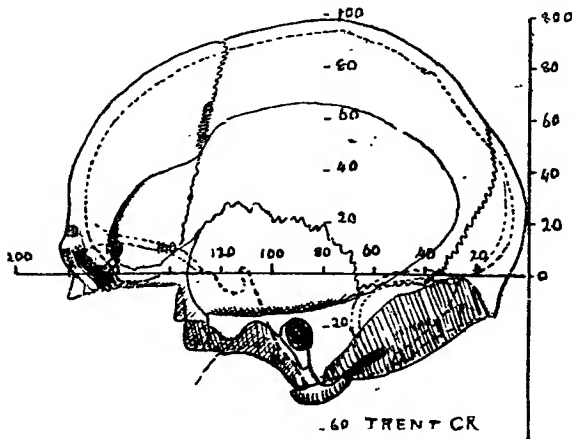
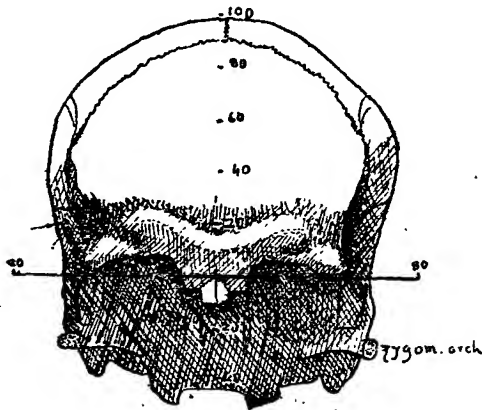


FIG. 10—PROFILE DRAWING OF THE TRENT (MUSKHAM) CRANIUM.
($\frac{1}{3}$ NATURAL SIZE.)

ings of the specimen in order that they may be compared with the corresponding drawings of the Halling man (Figs. 10, 11 and 12). Huxley supposed that the inhabitants of England at the earlier part of the Neolithic period were of this type, and the evidence accumulated in recent years points to his supposition as being

right. I had lately an opportunity of examining what is known as the "Wenden" skull, found at a depth of 22 feet in an old buried channel of the Cam. It is Neolithic in date, very probably early Neolithic. It is a woman's skull and representative of the river-bed type. Another skull in the museum of the Royal College of Surgeons was found during the excavation of the Manchester ship canal, at a depth of 27 feet. The age of the stratum from which it was recovered is unknown. It may be Neolithic in date, but of this there is no certainty. It also is of the "river-bed" type. Another example in the museum of the Royal College of Surgeons was discovered at Mickleton, Gloucestershire, in 1864, when a railway was being cut. It lay under a layer of peat and a stratum of clay 12 feet in depth. The skull found in the Gough Cave at Cheddar—late Paleolithic date—is also of this type. The Tilbury skull, also either late Paleolithic or



TRENT.

FIG. 11.—FULL-FACE VIEW OF THE TRENT CRANIUM.

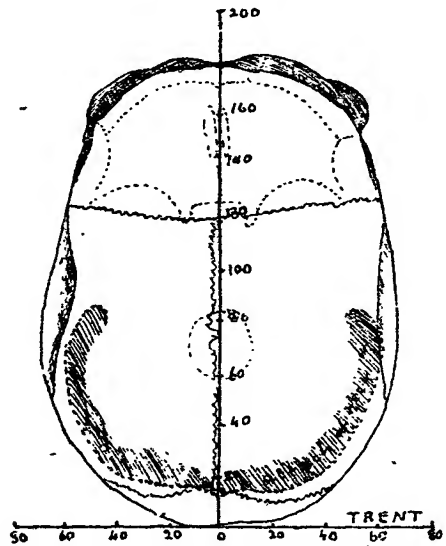


FIG. 12.—VERTEX VIEW OF THE TRENT CRANIUM.

early Neolithic, is of the same type. All are rather small skulls, with the width about 75 per cent. of the length, eyebrow ridges moderately marked, occiput rather projecting. The Halling skull is also of the "river-bed" type. The evidence seems fairly conclusive that the river-bed type was in England before the close of the Pleistocene period. If we look abroad we find traces of the same type on the Continent from the later phases of the Paleolithic period onwards. The famous Engis skull, described by Schmerling in 1833, found in a cave stratum with remains of Pleistocene animals, shows us that long before the close of the Pleistocene period the river-bed type was in Belgium. They have been found in the early Neolithic graves of Switzerland. The early Neolithic peoples on the shores of the Mediterranean appear also to have belonged to this type. The type still persists in England; it is still a predominating type amongst the working population of England.

THE CHEDDAR MAN: A SKELETON OF LATE PALÆOLITHIC DATE.

By C. G. SELIGMAN AND F. G. PARSONS.

[WITH PLATES XXIII-XXV.]

GOUGH'S CAVE, Cheddar, was discovered in 1877 by the late Mr. R. C. Gough, whose earliest investigations brought to light the remains of a number of extinct animals, including bear, hyæna, bison, rhinoceros and Irish elk.

The cave has been described by Mr. H. N. Davies, who points out that it is an old subterranean water-way in the carboniferous limestone of the Cheddar Valley. Mr. Davies' publications on Gough's Cave are as follows:—

"The Discovery of Human Remains under the Stalagmite Floor of Gough's Cavern, Cheddar," *Quarterly Journal of the Geological Society*, August, 1904; pp. 335-348.

"The Discovery of Human Remains under Stalagmite in Gough's Cave, Cheddar, Somerset," *Report of the British Association for the Advancement of Science*, 1904; pp. 569-570.

The first paper gives a valuable account of the geology of the cave, upon which we have not hesitated to draw; the second, necessarily short, is of special importance on account of the period to which Mr. Davies definitely assigns the human remains and worked stones found in the cave. Mr. H. St. George Gray has also written a note on the contents of the cave, which he recognised as belonging to the "Cave Period."¹

Since 1877 the proprietors of the cave have been busy at intervals clearing out the débris with which it was choked, but with so little method that even in 1904 Mr. Davies found it impossible to give the position or depth at which the remains of extinct mammals and various types of artifacts were discovered. In 1903, while clearing a small diverticulum on the north side, the workman found a human skeleton in position as shown in the diagram² (Fig. 1) in a deposit of cave earth containing boulders and blocks of limestone, underneath a layer of stalagmite which, as noted by Mr. Davies, is here about six inches thick. Mr. Davies gives the following deposits as occupying, or having occupied, the cave:—

- (a) Recent accumulations, which filled the entrance and covered the upper stalagmitic crust.

¹ *Somerset and Dorset Notes and Queries*, vol. ix, p. 2.

² We are indebted to Mr. Davies for permission to reproduce this diagram, which appeared in his paper in the *Quarterly Journal of the Geological Society*.

- (b) A calcareous bed, consisting of thin layers of friable stalagmite from 4 inches to 12 inches in thickness.
- (c) A bed of cave earth, 4 feet to 6 feet in depth, in parts rubbly and stratified, and containing large blocks of limestone which have fallen from the roof.
- (d) A lower bed of hard crystalline stalagmite, which has underneath it, here and there, beds of sand and pebbles."¹

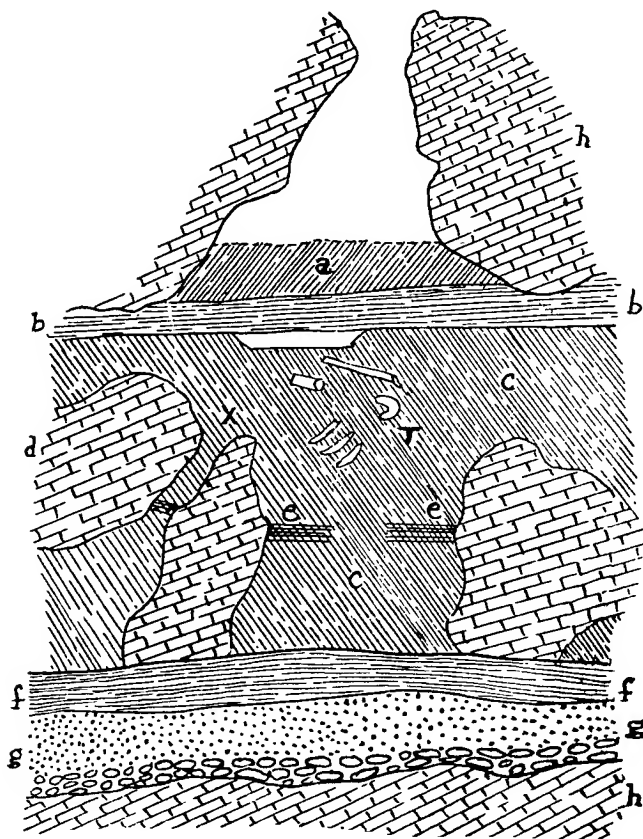


FIG. 1.—The bones shown were *in situ* in 1913 (Davies) and X marks the position in which the skull was found; T presumably represents the end of the tibia still (1913) in position (cf. Plate XXIII, Fig. 1).

- (a) = Recent accumulation of earth and stones; 6 inches.
- (b) = Upper bed of stalagmite; here 5 inches thick.
- (c) = Cave-earth, with encrusted boulder (d) and blocks of limestone and an intermediate band of calcareous deposit (e); $3\frac{1}{2}$ feet.
- (f) = Lower bed of stalagmite; 6 inches.
- (g) = Bed of sand and pebbles of carboniferous limestone and old red sandstone; 8 to 12 inches.
- (h) = Carboniferous limestone roof and floor.

These deposits pass without break into the lateral fissure in which the skeleton was found, and Fig. 1, Plate XXIII, is a photograph of part of the eastern wall of

¹ *Report Brit. Assoc.*, 1904, p. 569.

the fissure with the remains of the skeleton *in situ*, the most obvious bone being the lower articular facet of the right tibia, which projects somewhat from the wall of the section. The majority of the bones including the skull were, however, removed, and we owe to the courtesy of Mr. A. G. H. Gough, the present proprietor of the cave, the opportunity of studying these bones and the implements associated with them.

In the immediate proximity of the skeleton and under the stalagmite were found a large number of moderately long and narrow flakes, numerous worked flints, as well as a portion of an implement made of reindeer antler. A splint bone of *Equus* is also said to have been found under the stalagmite in close proximity to the skeleton.

Nothing is known concerning the bone implement shown in Fig. 2, except that it was found when exploring the cave, and that it did not come from the lateral

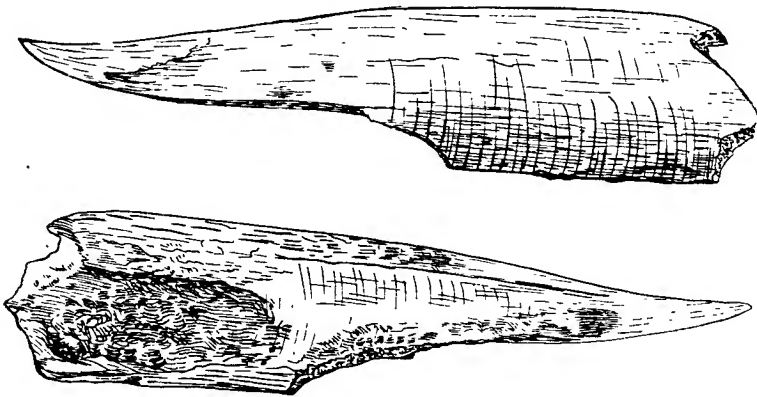


FIG. 2.—BONE IMPLEMENT FROM GOUGH'S CAVE.

fissure in which the skeleton was discovered. It may have come from the neighbourhood of the entrance, since a number of worked flints resembling those found near the skeleton, and illustrated in this paper, were found in the cave earth under the present asphalt floor, while within the last two years a hole said to have been between two and three feet deep, dug for drainage purposes at the side of this asphalt floor, has produced a number of flakes similar to those found near the skeleton, and also bones of *Bos*, *Equus*, and *Ursus*, perhaps *U. spelæus*.

Such briefly are the data available for judging the antiquity of the remains, and the race to which the Cheddar man belonged. We shall consider the two questions independently, beginning with the question of the age of the remains, postponing the detailed description and comparison of the bones until after the other evidence has been examined.

Direct evidence as to the age of the remains is yielded on the geological side by the position of the skeleton and accompanying artifacts, while on the anthropological side the character of the artifacts is of the greatest importance. Owing to the circumstances of the discovery it is quite uncertain whether we are dealing

with a burial or an accidental inhumation, so that the chronological assistance that might have been derived from this side is entirely lacking. We may, however, note that there was no trace of any red pigment on any of the bones we examined, while on scraping away the earth that still encrusted the neck of the femur we discovered a minute portion of charcoal. Mr. Davies was able to give the following brief account of the position of the body, and it will be seen that he considers its presence in the cave accidental. "One shin-bone touched the bottom layer of the stalagmite, and was encrusted; the other bones were in the earth. The skull was lying in a slightly lower position than the pelvis and lower extremities, at the spot marked X in Fig. 1. The legs were drawn up, one of the arms bent so as to bring the hand to the back of the head, and the whole position of the skeleton such as would have been assumed by the body of a drowned man swirled into its last resting-place by a rushing torrent."¹

Turning now to the geological evidence of age, we may again quote Mr. Davies. The lateral fissure in which the human remains were found remained until recently "absolutely choked with rock débris and earth. But as the waters had entered the cavern from the fissures on the south side of the cave drained backward toward the low[er] level . . . the chambers and passages were often flooded; and this state of affairs causing great loss to the owner, he determined to clear out the lateral fissure . . . and drain off the flood-waters into it; thus, as it afterwards appeared, imitating Nature's own method of getting rid of them. It was while this project was being put into execution that the discovery was made."

The section (Fig. 1) "will give an idea of the succession and proportional thickness of the deposits that had to be cut through. It was found that a sudden drop of a few feet occurred at the mouth of the fissure, and this brought the accumulation to a depth of over 12 feet. The deposits of the main cavern passed into this branch without break, but they took a downward inclination, maintaining a certain parallelism with the floor and roof. A space only just high enough to enable a man to crawl in, existed between the upper surface of the drift and the roof at the entrance. About 12 feet within the fissure a smaller rift in the right-hand wall was discovered. . . . It is very narrow above, but widens to three feet at the lower end. The skeleton was found at the junction of these two fissures. The surface accumulation had been removed, the stalagmite crust—here five inches thick—had been cut through; and a large quantity of cave earth and great blocks of stone from the central part of the fissure had been cleared away in making a deep trench for the drain-piping, when two feet below the under-surface of the stalagmite, the human skull was brought to light. It was taken out in pieces, but so carefully that there was no difficulty in putting it together again. The rest of the skeleton was then unearthed; and the bones of an arm and a leg, some ribs, and a part of the pelvic girdle were removed."²

¹ *Quarterly Journal of the Geological Society*, 1904, p. 342.

² *Op. cit.*, pp. 339-342.

Considering the rapidity with which stalagmite sometimes forms we may conclude from this description that the geological conditions offer no certain evidence of the date of the find, and this view is supported by the discussion which took place when Mr. Davies read his paper to the Geological Society; for although the author definitely attributed the find to the end of the palæolithic period the gentlemen who discussed his paper unanimously rejected his conclusion, apparently basing their opinion largely on the character of the implements found with the skeleton.

We may preface our account of the artifacts of stone and reindeer antler found with the skeleton, by saying that when we first visited the cave we did not know of Mr. Davies' work and did not hear of it there, only becoming aware of it when taking some bones to the British Museum (South Kensington). However, the character of the stone implements had impressed us at our first visit as Magdalenian, and at our request Mr. Gough allowed us to borrow a number of them for submission to M. Breuil, who confirmed our diagnosis, as did also Dr. Sturge and Mr. R. A. Smith, who each examined them independently. There is thus strong *prima facie* reason to believe that Mr. Davies is correct in assigning the remains to the late Palæolithic or, as he definitely states, to Mortillet's "Magdalenian" Age of Culture at the close of the Palæolithic Period.¹

In support of this conclusion we may adduce the character of the stone and bone implements. To take the latter first on account of its extremely typical character, this implement is part of a so-called *bâton-de-commandement* and, as is shown in the drawing (Fig. 3), the fragment of the *bâton* that has survived bears a curious resemblance in shape to a portion of the left femur of a half-grown lad. The maximum length of the specimen is about 140 mm.: beginning at the side of the notch, it has engraved upon it a number of deeply incised irregularly spaced lines which evidently ran round the shaft in an oblique spiral, though only a little more than a single complete turn has survived. Besides the deeply incised

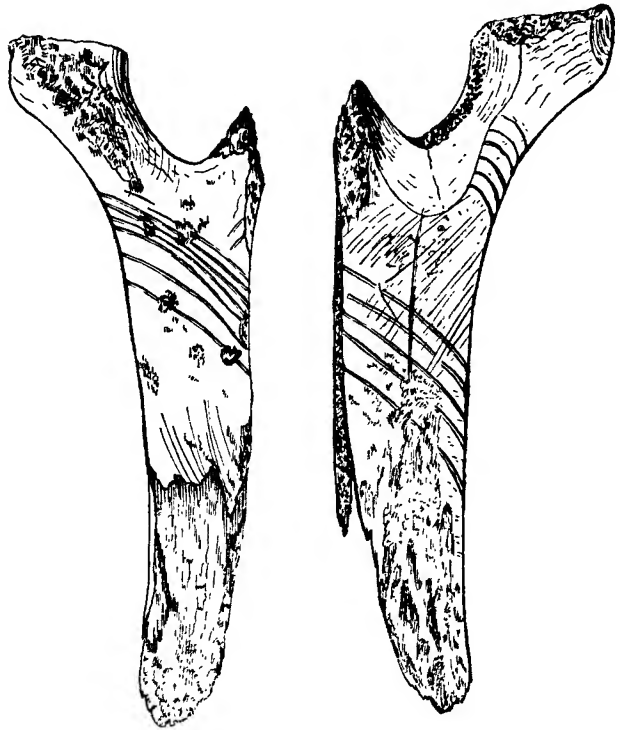


FIG. 3.—"BÂTON-DE-COMMANDEMENT" FROM GOUGH'S CAVE, $\times \frac{2}{3}$.

¹ *Report Brit. Assoc., loc. cit.*

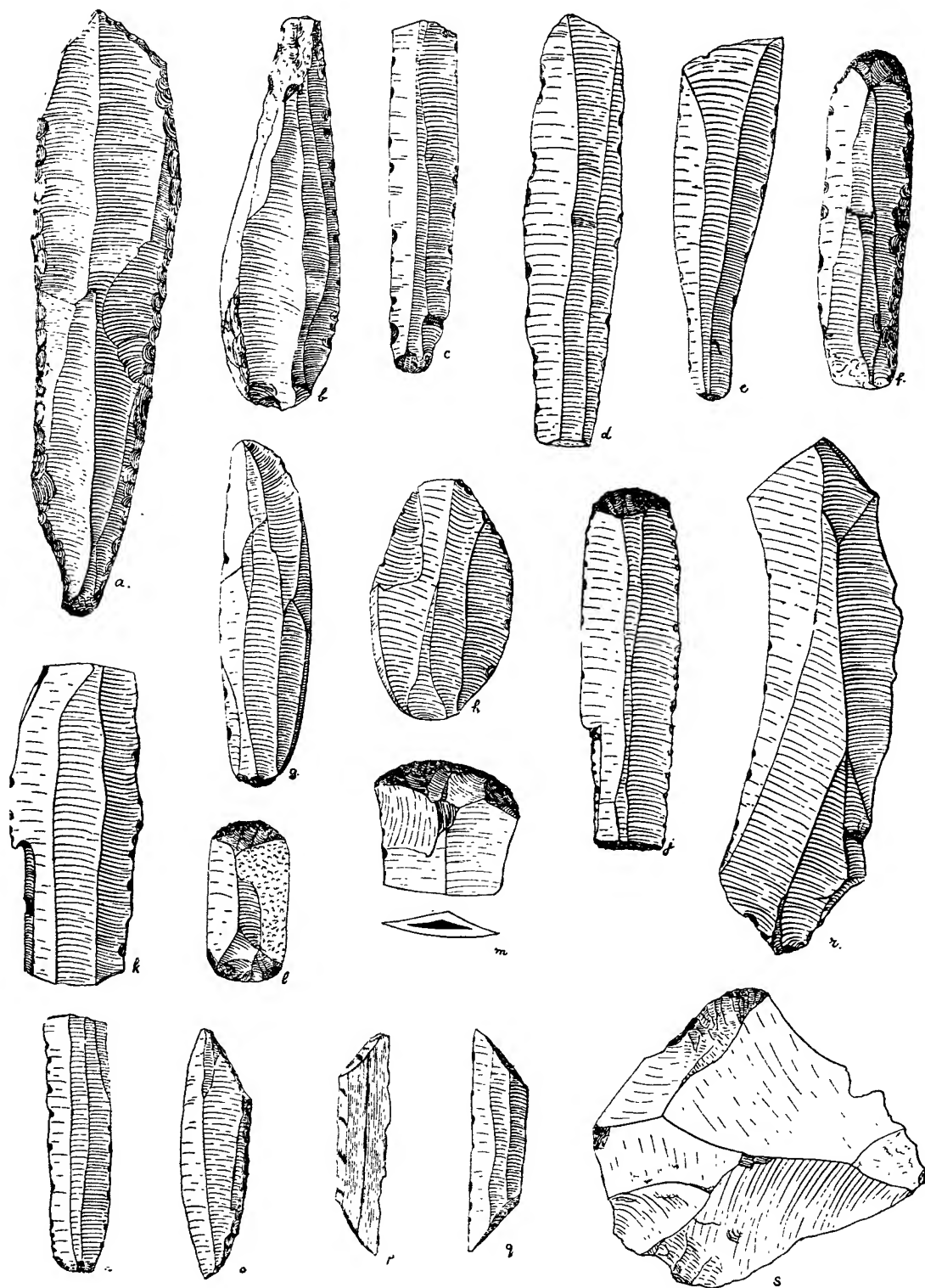


FIG. 4.—WORKED STONES FROM GOUGH'S CAVE, $\times \frac{3}{4}$; *p.* FROM KENT'S CAVERN (AFTER EVANS).

lines there is a number of irregular and much lighter scratches indicated above the deeper lines in the figure. The majority of these are obviously purposeful, but some may be accidental and due to weathering.

Passing to the stone implements, the majority are elongated and narrow, worked on one side only, usually with little or no secondary working along the edges, patinated to a dull white or slightly yellow colour in almost every instance, though the patina of a few specimens is lustrous. The process which has brought about the surface change described has penetrated far into the substance of the stone, for in the case of one implement with a dull white surface which was accidentally broken across, the whole substance of the flint was white and friable, and easily scraped to a powder with a pocket knife, the only possible remains of the original condition of the stone being a doubtful dark-coloured speck in the very centre of the broken surface. The progress of the change is well shown in the transverse section of the fine end-scraper shown in Fig. 4, m. This specimen is roughly triangular in section, with a maximum thickness of about $6\frac{1}{2}$ mm. The edges are completely converted into a white friable substance; indeed this change has spread inwards from every surface of the stone for nearly 2 mm., leaving only a comparatively small core of unaltered flint in the middle. The appearance of these flints suggested that the change might be directly due to a partial removal of their substance accompanied by a deposition of the lime dissolved in the water which percolates through the cave, but chemical analysis shows that this is not the true explanation. A portion of a flake with a maximum thickness of about 3.5 mm., which had undergone the change throughout the whole of its substance, was sent to Dr. H. R. Le Sueur for examination. Dr. Le Sueur found the merest trace of calcium, and suggests that the change is a physical one, the white frangible material being either a crystalline or a dehydrated form of the colloidal flint.¹ Whatever may ultimately be determined as to the nature of the process, it does not seem likely that it depends essentially on conditions peculiar to caves, for it is found in neolithic specimens collected from the surface of the ground. An early neolithic chipped but unpolished adze head from Monkton, with a dull white surface mottled with grey, the whole heavily but irregularly stained with iron, shows the same change, which has penetrated the implement in places for a depth of more than 2 mm. The distribution of the change is, however, decidedly patchy; this is probably of no great significance, since even in some of the cave specimens there is considerable variation in the amount of alteration they have undergone. Again, a neolithic flake from Poundbury²

¹ It seems worth noting that the microscopic examination of sections does not show any obvious trace of coarse crystalline structure in either the altered or unaltered part of the flint, which appears to consist of spherules of a homogeneous material which have coalesced, and through which minute more highly refractive bacilliform elements (crystals?) are irregularly distributed. In the altered portion spherules are much more obvious than in the unaltered, and there is a considerable change in the refractive index.

² For these specimens we are indebted to Captain J. E. Acland, curator of the Dorchester Museum.

shows the same white "patina," though the change has not penetrated as deeply as in the cave specimens, and even where it has occurred, the stone, though it can be scraped away with a knife, is not so extremely friable.

Of carefully made and finished implements, end-scrapers are the most common, and the series includes one beautifully made double end-scraper, the total length of which scarcely exceeds 3.5 cm. (Fig. 4, l). This is one of the smallest implements; at the other extremity of the scale is an unusually long blade, worked all round its edge and showing at one end the *coup du burin*. This specimen (Fig. 4, a) is about 12.5 cm. long and has a maximum breadth of about 3 cm. Smaller and more typical blades such as those shown in Fig. 4, d and f, also occur, and certain of the flakes have an abrupt transverse ending as though intended to be used as graving tools. Fig. 4, h, represents an implement of uncommon form; it is an unusually broad flake which appears to have been trimmed to its present shape. Besides the more or less well formed implements, there are a large number of thin narrow flakes such as would easily be worked into blades or end-scrapers, and a few larger coarser flakes such as those shown in Fig. 4, r and s. One of these (Fig. 4, s) shows traces of secondary working.

We may now discuss the collateral evidence bearing on the age of these implements. In the first place there is the *facies* of the whole series which undoubtedly recalls the later palæolithic. But the period covered by this term lasted from the early Aurignacian to the late Magdalenian, and was of immense duration, so that it should be possible to determine the age of the specimens within closer limits. Until very recently it was believed that the *bâton-de-commandement* occurred only in the Magdalenian, so that the fragmentary specimen found in Gough's Cavern seemed to indicate beyond cavil that part at least of the contents of the cave were of Magdalenian age. But recent discoveries in France, notably the excavation by Monsieur L. Didon of a rock-shelter at Blanchard in the commune of Sergeac (Dordogne),¹ has shown that these implements were made and used during the Aurignacian. There are, however, certain minor differences between the Aurignacian and Magdalenian *bâtons*, and M. Breuil is of the opinion that the Cheddar specimen is of the Magdalenian type.

There is nothing conclusive about the bone piercing implement shown in Fig. 2, but the probability that it is of palæolithic age is increased by its general resemblance to a "kind of awl"² found in Kent's Cavern, associated with fauna which included many extinct species, such as the mammoth, woolly rhinoceros, cave-lion.

Turning to the stone implements, the specimens from Gough's Cavern show the closest resemblance to some of those from Robin Hood Cave, Creswell

¹ L. Didon, "L'Abri Blanchard . . . Gisement Aurignacien Moyen," *Bulletin de la Société historique et archéologique du Périgord*, 1911. M. Breuil informs me that *bâtons* also occur in the upper Aurignacian, and that they have been found in deposits of this age at Laussel, La Ferassie, Solutré, and Gargas.

² A drawing of this specimen (No. 1835) is reproduced in Evans' *Ancient Stone Implements*, Fig. 407, p. 506.

Crags. The series in the British Museum includes single and double end-scrapers¹ exactly like those in Fig. 4, while this also holds good of a number of long "blades" with dull white patina. So, too, implements precisely similar to those from Cheddar have been obtained from the three- and four-foot levels of Kent's Cavern. These implements also have the same white patina, and we may refer to the extraordinary similarity, amounting to absolute identity in form, shown by the stone reproduced in Fig. 4, q, and one from Kent's Cavern (Fig. 4, p), our figure of the latter being copied from the drawing given in *Ancient Stone Implements* (Fig. 400, p. 502).

It seems then that there can be little doubt as to the palæolithic origin of the stone implements from the Cheddar Cave, for as far as we know not even the most thorough-going upholder of the modern (Neolithic or Bronze Age) origin of these specimens has suggested that Kent's Cavern and Robin Hood Cave are other than palæolithic, but since the study of cave deposits is so much further advanced in France than in this country we will refer briefly to two French stations. There is the closest resemblance in type, extending sometimes even to patination, between implements from Gough's Cavern and those of Bruniquel (Magdalenian) of which there is a large series in the British Museum.² There is also La Grotte de la Mairie at Teyjat (Dordogne) where the stratification has been most carefully studied by MM. Capitan, Breuil, Bourrinet and Peyrony³; the blades and end-scrapers from this station are of exactly the same type as those from Cheddar.⁴

Considering and weighing all these facts, we think there can be no reasonable doubt that the Cheddar implements belong to that late portion of the Upper Palæolithic which is known as Magdalenian, and in support of this opinion we would repeat that M. Breuil, who examined the majority of the implements figured in this paper, shares our view.

We may now turn to the bones, but before describing these, we may point out that we shall, whenever possible, compare the characteristics of these bones, and especially of the skull, with the bones of the later inhabitants of this country.

THE SKULL.

As will be seen from the photograph (Plate XXIII, Fig. 2) the skull was coated in many places with a deposit of stalagmite which we were not allowed to remove. Mr. Davies rightly says "the face is much mutilated" but he is obviously

¹ *e.g.*, those reproduced in the *Stone Age Guide* (1911) in Fig. 79, p. 71.

² We take this opportunity of expressing our thanks to Mr. Reginald Smith for his assistance in the examination of specimens in the national collection, as well as for a number of references. Some account of Bruniquel will be found in *L'Anthropologie*, vol. xiv, 1903, pp. 129-130.

³ "La Grotte de la Mairie à Teyjat . . ." *Revue de L'Ecole d'Anthropologie de Paris*, vol. xviii, 1908. A diagram of the strata is given on p. 155.

⁴ *Op. cit.*, *cf.* especially Figs. 55 and 56 (p. 161), and also Fig. 80 (p. 201).

inaccurate in saying that the left malar bone is missing; what he meant, no doubt is that part of the right malar has been destroyed.

Norma Facialis.

The photograph which we publish (Plate XXIII, Fig. 2) gives a good general idea of the norma facialis of the skull, orientated carefully to the Frankfurt plane, but for purposes of comparison a projection contour was made with Martin's dioptograph and this, reduced to half-scale, is shown in the continuous tracing in Fig. 5, a.

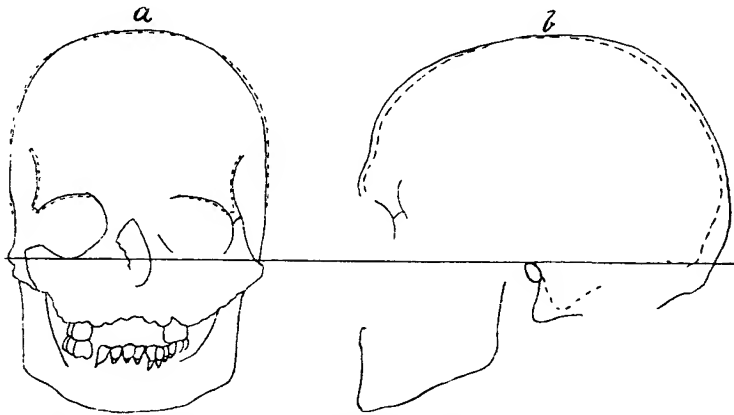


FIG. 5.—CHEDDAR MAN (CONTINUOUS LINE) CONTRASTED WITH OUTLINE OF 7 RIVER BED SKULLS (INTERRUPTED LINE).

Contrasted with it is the composite tracing of seven river-bed skulls, taken in the way described by one of us in a paper on Bronze Age skeletons,¹ and represented by an interrupted line. Superimposed in this way the striking resemblance of the contours of the Cheddar and River Bed skulls is at once appreciated; they are

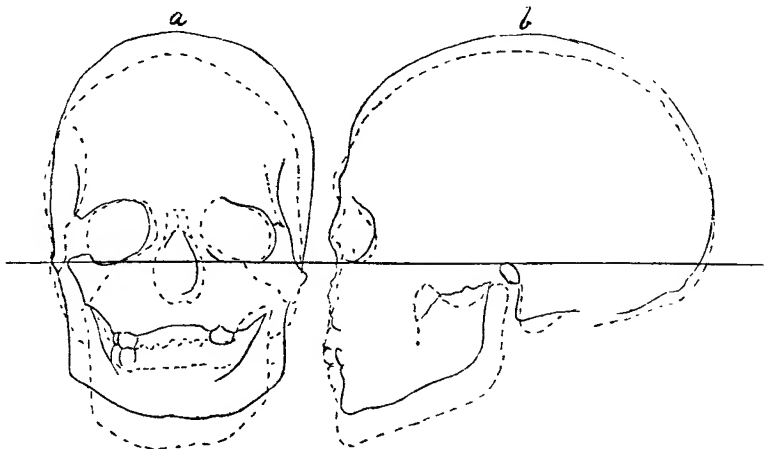


FIG. 6.—CHEDDAR MAN (CONTINUOUS LINE) AND COMBE CAPELLE SKULL (INTERRUPTED LINE).

¹ F. G. Parsons, *Journ. Roy. Anth. Inst.*, vol. xliii, p. 550.

practically of the same width and height, but whether the facial contours also agreed we cannot say, since so few of the river-bed faces have been preserved.

The next contour (Fig. 6, a) shows the *norma facialis* of the Cheddar man contrasted with a probably older palæolithic skull, the Aurignacian of Hauser from Combe Capelle. This skull has been carefully described by Professor Klaatsch, who has published a photograph of the facial view, but we have not been able to use it because the skull was obviously orientated on a different plane from that of the Frankfurt Convention, and this would lead to a considerable apparent diminution in its height. We were, however, able to trace a contour of a cast of the original skull and this was orientated in exactly the same way as the Cheddar skull. The

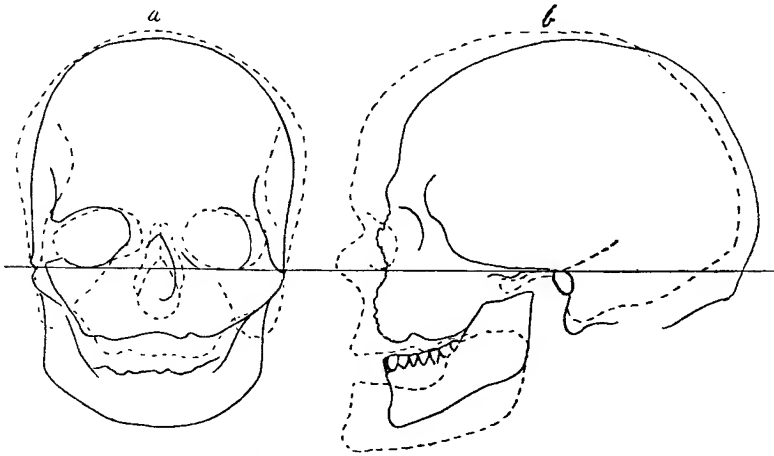


FIG. 7.—CHEDDAR MAN (CONTINUOUS LINE) CONTRASTED WITH THE "OLD MAN" OF CRO-MAGNON (INTERRUPTED LINE).

latter (continuous line) is superimposed on the Aurignacian (interrupted line), the Frankfurt plane being common to both. The Aurignacian differs from the Cheddar skull in having a wider nose, a lower brain case, and a much longer face; moreover the enormous splay of the Cheddar mandible is quite distinct, though we have no means of knowing whether this is anything more than an individual variation. Fig. 7, a, shows the Cheddar skull superimposed on another palæolithic and probably Aurignacian type, the "old man" of Cro-Magnon. This is a skull of larger size in every respect, but the deeper face and much wider orbits are very noticeable.

Turning to more modern skulls, Fig. 8 gives the superimposed tracings of the Cheddar skull and a contour derived from those of eight male Anglo-Saxons from various parts of England. Contrasted with the Saxons it is obvious that the Cheddar

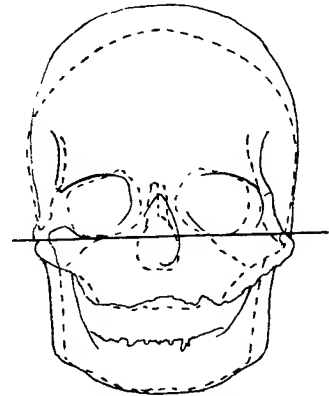


FIG. 8.—CHEDDAR MAN (CONTINUOUS LINE) AND OUTLINE OF 8 ANGLO-SAXONS, HEIGHT BELOW AVERAGE (INTERRUPTED LINE).

skull is a trifle narrower and a good deal higher in the cranium, though we have reason to believe that the Saxon skulls from which the contour is derived are somewhat below the average height; on the other hand, the Cheddar skull is distinctly broader in the face and lower jaw. The square orbits of the Saxon face contrast with the elongated orbits of the Cheddar skull, though the nasal aperture seems to correspond fairly accurately in width, but not in height, in the two.

The damaged condition of the face of the Cheddar skull, and the presence of stalagmite, made measurements of this region very difficult, and none too trustworthy; still, as far as we could judge, they are as follows:—

	mm.
Greatest length of skull	196
Greatest breadth of skull	138
Breadth index	704
Least frontal width	103
Biorbital breadth	103
Bijugal breadth	139
Bimaxillary breadth	—
Height of nasal aperture	—
Breadth of nasal aperture	24
Height of R. orbit	32
Breadth of R. orbit	40
Orbital index	800
Biangular breadth of mandible	109

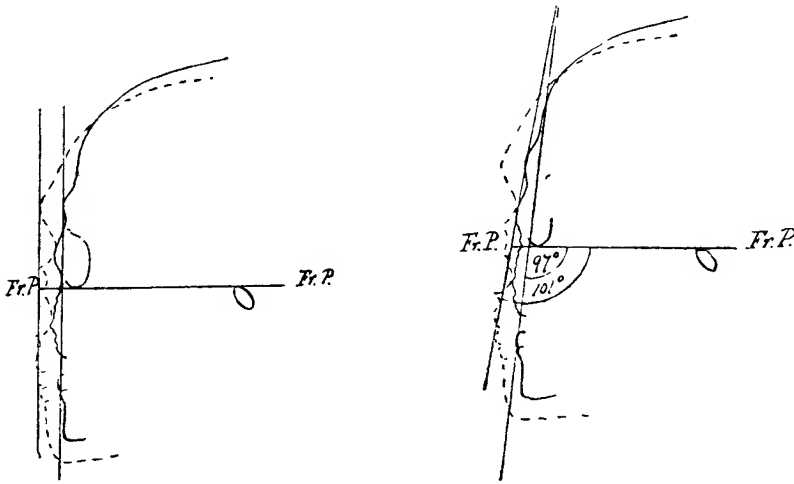
Mr. Davies makes the greatest breadth 130 mm., but the skull is so broken and crusted that it is difficult to know where to place the limbs of the craniometer. In these cases it is comparatively simple to get projection contours from in front, from behind and from above, and thus to find the greatest breadth.

According to the orthodox tabulation, the orbital index would make the Cheddar skull very microseme, more so indeed than the Tasmanians, Australians, and Bushmen, but we consider the index of no great value, and the real fact which the superimposed projections teach us is that while the Cheddar orbits are as high as those of the Saxons they are very much wider, though not so wide as those of the Cro-Magnon skull.

Norma lateralis.

From this point of view the skull (Plate XXIV, Fig. 1), if it belonged to a modern man, would be described as long, high, and well developed. We cannot agree with Mr. Davies when he says that "prognathism must have been a marked feature of the face" and that "the frontal is receding." It is quite possible that Mr. Davies, whose geological expert knowledge is so welcome, was not in touch with cranio-logical methods of orientating a skull, and so got an erroneous impression of the

amount of prognathism by tilting up the face too much. There are a great many ways of estimating prognathism, some liable to error through some disturbing factor such as shortness or length of face, others too complicated for everyday use. As we understand it, prognathism is the slant which the face bears to the plane of the base of the skull, and anthropologists having decided to sink their differences and loyally to accept the Frankfurt plane as the working base line of a skull, what more do we want than to take the angle which the plane of the face makes with this line? But what is the plane of the face? We can, of course, follow the example of most of the German anthropologists and draw a line on the facial contour touching the glabella and incisor point, as we have done in Fig. 9, where



FIGS. 9 AND 10.—CHEDDAR MAN (CONTINUOUS LINE) AND COMBE CAPELLE SKULL (INTERRUPTED LINE) SHOWING PROGNATHISM.

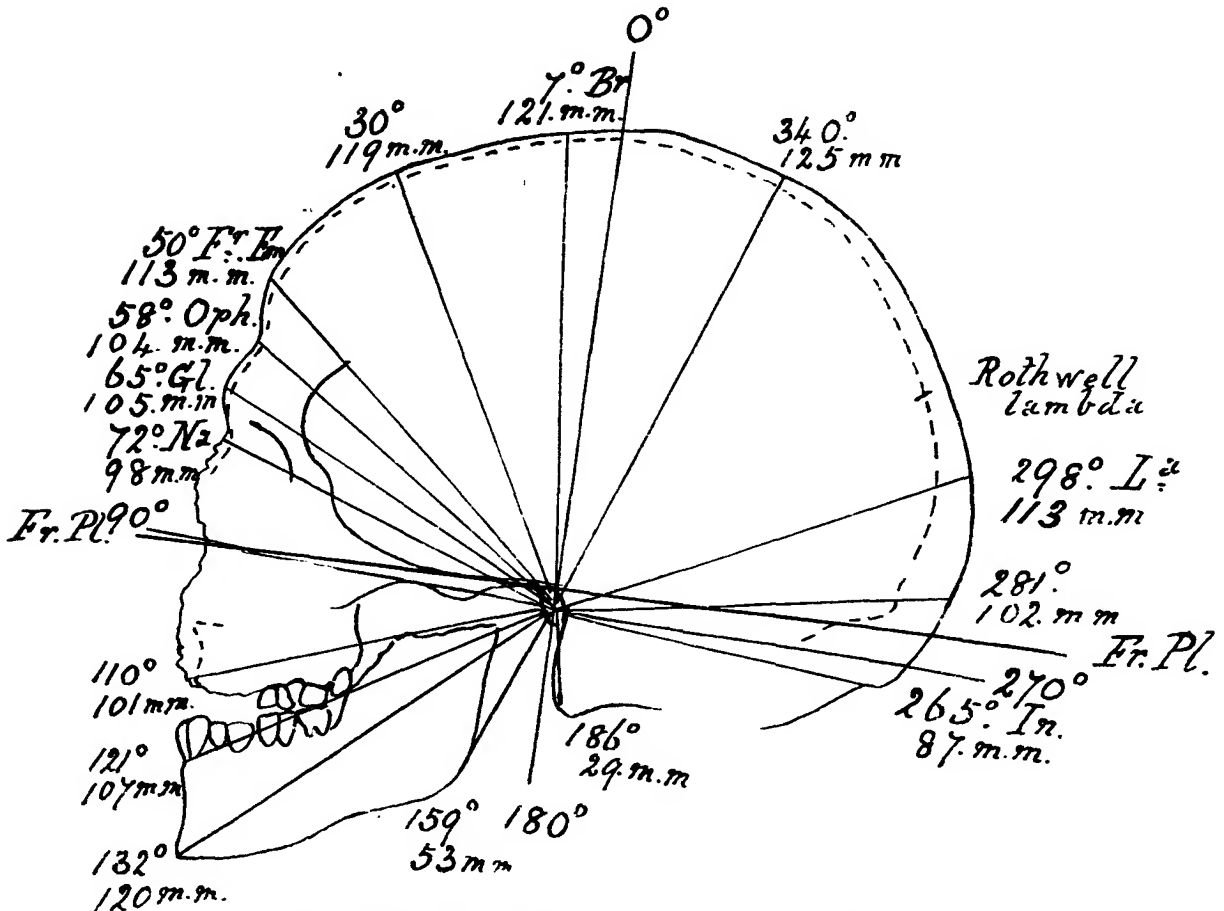
the face of the Cheddar man is compared with that of Hauser's Aurignacian man, the external auditory meatus and Frankfurt plane (Fr. P.) of both being coincident. Treated in this way, the prognathism of the two faces is identical, but it will be quite clear to any person of common sense that the greater projection of the jaws of the Aurignacian is masked by the greater development of the supraciliary eminences and glabella, and that in this way the one indication of a low type of skull counteracts the other and gives a misleading result. If we only want to estimate the snout-like tendency of the face under the term prognathism we should evidently take our facial plane from the nasion to the incisor point; but if the facial plane is to include the forehead, as well as the rest of the face, we shall get a much juster comparison if a line is drawn from the frontal eminence, which is almost always perfectly obvious in a sagittal section or lateral projection of the skull, to the incisor point (see Fig. 10).

Treated in this manner the Cheddar face has an angle of 97 degrees with the Frankfurt plane, while the Aurignacian skull makes one of 101 degrees, an appreciable increase of prognathism in the latter.

The next point to determine is how the Cheddar man compares in prognathism with other skulls.

The lateral projection of the Cheddar skull superimposed on that of the Cro-Magnon shows that the latter skull is the less prognathous of the two. Unfortunately we cannot compare the prognathism of the Cheddar skull with that of the seven river-bed specimens, since the face is only really available in one of them—that from the Manchester Ship Canal—and in this skull the angle of prognathism is 114 degrees, while the remains of the Halling skull make us think that its degree of prognathism was identical with that of the Cheddar skull. Enough, however, has been said to negative the idea that the Cheddar skull was prognathous.

We do not know of any record of a series of modern English crania, since most of those which are used for teaching purposes are foreign, but we have records of thirty male Rothwell skulls and eighty male skulls from Hythe. We believe that we may regard the former as typically English, although they date from the fourteenth and fifteenth centuries. Fig. 11 shows the contour of the Cheddar man



superimposed on the type contour of thirty Rothwell males, with the result that the Cheddar skull is only one degree more prognathous than those of Rothwell; while in the same way we could demonstrate that it is only two degrees more prognathous than the average of eighty Hythe skulls.

In the left norma lateralis of the Cheddar skull there are two fairly large gaps (see Plate XXIV, Fig. 1) which allow the intra-cranial condition of the sutures to be seen, as well as the thickness of the skull wall. The sutures are open both extra- and intra-cranially, a condition which, if the sutures behaved in prehistoric times as they do now, would make us fairly sure that the individual was under 30 years of age, and it will be seen later that this agrees with the evidence of the rest of the skeleton. With regard to the thickness of the skull walls we readily agree with Mr. Davies that the frontal bone in places is 9 mm. thick, but although we find that the average of a considerable number of modern male bones used for teaching is 7 mm., we have experienced no difficulty in picking out several with a thickness of 9 to 10 mm., so that we do not think that the thickness of the frontal should be regarded as necessarily a sign of antiquity.

A great deal of stress is laid by the possessors of the skull, upon the prominence of the temporal ridge where it is joined by the posterior root of the zygoma, above and behind the external auditory meatus. This prominence is undoubtedly more marked than in modern European skulls, and in many ways resembles the condition in the Combe Capelle skull of Hauser. This prominent ridge, which no doubt attaches the lowest and most posterior fibres of the temporal muscle, is by no means a very constant characteristic of early prehistoric skulls, and as we have seen it very well developed in the skulls of Negroes and Papuans we are not at present inclined to believe it has any racial significance.

We now propose to contrast the lateral contour of the Cheddar skull with that of certain other British skulls, and whenever possible they are superimposed in such a way that the external auditory meatus and Frankfurt plane are common. As already stated, Fig. 11 compares the Cheddar skull with the type contour of thirty male skulls of mediæval Englishmen from Rothwell; it shows that the older skull is longer and deeper in the occipital region than the more modern type, though in the auricular height (115 mm. from the top of the meatus) there is little to choose between them. The various radiating lines with their lengths and angles show the method devised by one of us¹ for recording the contour of skulls applied to that of the Cheddar man. By using different lengths and angles, the Rothwell type contour may be obtained.

Fig. 12 shows the side view of the Cheddar skull contrasted with the lateral type contour of thirteen male Saxons from various parts of England. This takes us a little further back in historic times, and it makes an interesting comparison because here we have examples of two long-headed races. It will be noticed that the Saxon skull as exemplified by these thirteen specimens is shorter and better developed in

¹ F. G. Parsons, *Journal of Anatomy and Physiology*, vol. 44, 1910, p. 396.

the region of the frontal eminences; moreover, there is relatively a good deal more brain space in front of the external auditory meatus than in the older type.

The great occipital depth and lowness of the inion of the Cheddar skull is just as remarkable when compared with the Saxons, as it was when compared with the thirty mediæval Englishmen from Rothwell (see Fig. 12).

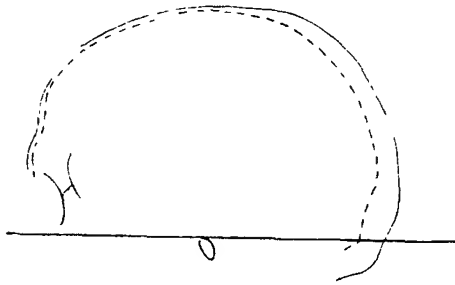


FIG. 12.—CHEDDAR MAN (CONTINUOUS LINE) AND OUTLINE OF 13 ♂ SAXONS (INTERRUPTED LINE).

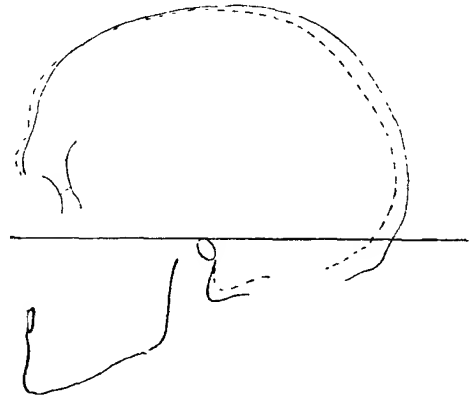


FIG. 13.—CHEDDAR MAN (CONTINUOUS LINE) AND OUTLINE OF 4 NEOLITHIC SKULLS (INTERRUPTED LINE) FROM COLDRUM.

We must now pass over two races or epochs with scant notice. We cannot compare the Cheddar skull with the Celtic or early British because we have no real knowledge of the skull form of this people, and we do not feel justified in occupying space by a comparison with the skulls of the Bronze Age inhabitants of Britain because we can distinguish no points of resemblance between the two.

We are able, however, to compare the Cheddar skull with a type contour of four neolithic skulls from the dolmen at Coldrum in Kent (Fig. 13) and are greatly indebted to Professor A. Keith for the loan of these skulls from which to work out the type. It will be noticed that this is a very close approximation to the Cheddar contour, even in the occipital region, which has hitherto been such a contrast to other types.

The next comparison is with the lateral type contour of seven river-bed skulls (see Fig. 5, b). It will be noticed how closely the contours correspond, except in the occipital depth.¹

Fig. 14 shows the lateral contours of the Cheddar skull, and of three others which are generally accepted as examples of the Magdalenian epoch, namely, the Chancelade, the Placard and the Laugerie Basse crania.

It will be noticed that, as far as can be judged from the lateral point of view, there is nothing to make us doubt that these skulls belonged to members of the race which in this country we speak of as the "River Bed" type.

¹ In a paper published in the *Proceedings of the International Medical Congress in London, 1913*, the individual contours of these seven skulls are recorded.

When we come to a comparison between the lateral views of the Cheddar and Aurignacian type as exemplified by the Combe Capelle (Fig. 6, b) and Cro-Magnon (Fig. 7, b) specimens it is obvious that though the latter two have not many points in common they both differ from the Cheddar man in the much greater development of the maxilla and mandible, and also in having wider and shallower orbits.

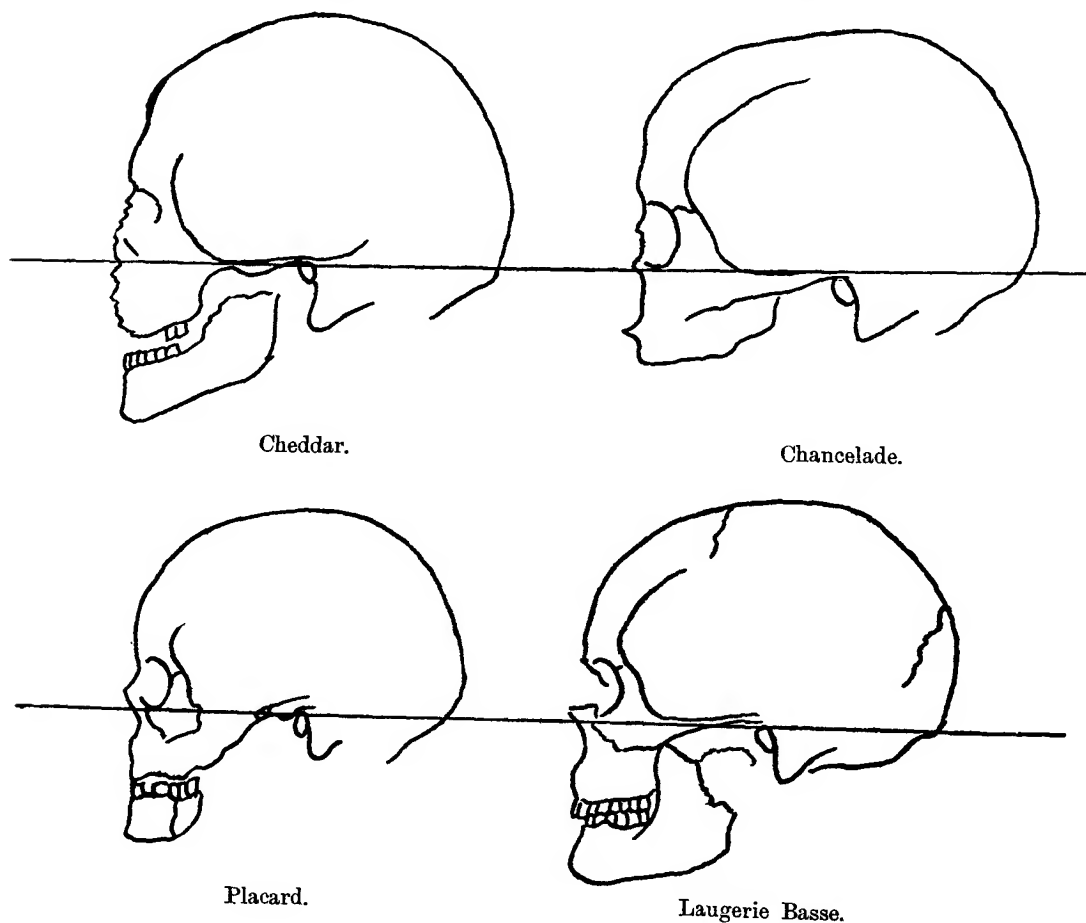


FIG. 14.—OUTLINES OF MAGDALENIAN SKULLS.

The side view of the Cheddar man would not, as far as we can tell, have attracted any notice in a modern crowd, though this aspect of the two other skulls certainly would.

Norma verticalis.

The vertical view of the skull is, we think, in spite of Sergi's monumental work, less valuable than either of the two preceding ones for classifying skulls.

In the crypt of the church at Hythe there are two kinds of skulls; some are remarkably short and have been derived from the Continent, where the Alpine

race is predominant.¹ The others are long, and a type contour which was made of six of them corresponds almost exactly to a type contour made of thirty of the male Rothwell skulls. We may take this contour as representing fairly accurately the vertical view of an average Englishman of the fourteenth century, and contrast it with the Cheddar skull (see Fig. 15). When this is done

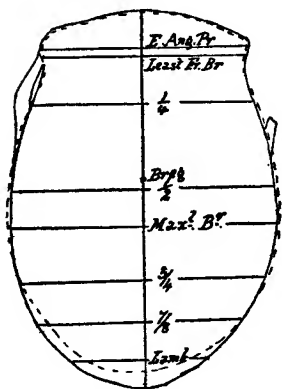


FIG. 15.—CHEDDAR MAN (CONTINUOUS LINE) AND TYPE OF ROTHWELL AND LONG HYTHE SKULLS (INTERRUPTED LINE).

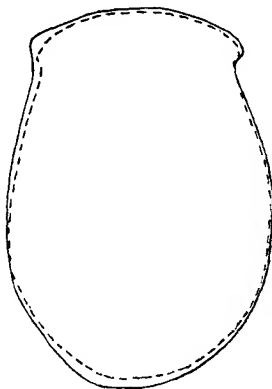


FIG. 16.—CHEDDAR MAN (CONTINUOUS LINE, AND TYPE OF 7 RIVER BED SKULLS (INTERRUPTED LINE).

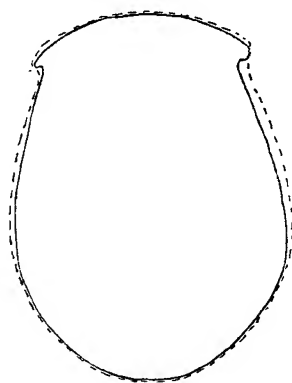


FIG. 17.—TYPE OF 7 RIVER-BED SKULLS (CONTINUOUS LINE) AND TYPE OF 36 MEDIÆVAL SKULLS (INTERRUPTED LINE).

it shows that the Cheddar skull is longer (196 : 186 mm.) and slightly narrower (138 : 142 mm.) than the average mediæval English. These differences when we are dealing with a single skull are trivial and quite within the range of individual variation, and it will be noticed that the contours are wonderfully alike.

Fig. 16 gives the Cheddar skull superimposed on the contours of seven River Bed skulls, showing that it is longer (196 : 186 mm.) and of practically the same width, while in Fig. 17 the type contour of the seven River Bed skulls is superimposed on the type of thirty from Rothwell, which is identical with the six long skulls from Hythe.

The comparison between the seven River Bed skulls and the thirty-six mediæval English shows that the length is the same, but the skull has appreciably increased in width in its anterior half. Whether this is a legacy from the Bronze Age invasion is an interesting problem, though it hardly affects a description of the Cheddar skull.

THE TEETH.

The teeth in the lower jaw (Plate XXIV, Fig. 2.) are very perfect and, although their possessor was probably between 24 and 28 years of age, show very little sign of grinding down. This, no doubt, was due to his having lived largely on fleshy

¹ This question is discussed by one of us (F. G. P.) in *Archæologia Cantiana*, vol. xxx.

food and roots, rather than on cereals ground with soft stones, as was the case with the Saxons and mediæval English people.

The dental arcade is a very perfect one, and shows little indication of the hypsiloid arch so common in the lower races of mankind. The last molar, it will be noticed, is nearly as large as the second.

LIMB BONES.

The left femur is singularly well preserved owing to its two ends being encrusted in stalagmite. This we were allowed to remove and are thus, fortunately, able to contrast this femur with the average of some 200 male femurs from the mediæval English skeletons preserved in the crypt of the church in Rothwell, Northants.¹ The length of the bone is 440 mm. in the maximal measurement from the top of the head to the internal condyle, and 435 in the oblique position.

This maximal length, according to Pearson's chart, would give a stature of 164 cm., or 5 feet 4½ inches, to its possessor, but one must not place too much reliance on this, because experience shows that though Pearson's chart is generally accurate for an average of ten or twelve femurs, it may be misleading for a single one.

The head is 47 mm. in diameter, which of itself is enough to make one strongly suspect that the sex was male, since females are seldom found with as large a femoral head as this. On comparison with several femurs from Rothwell of about the same length we find that the ratio of the head diameter to the maximal length of the bone is perfectly normal.

The angle which the neck makes with the shaft is 120 degrees. When this is contrasted with 104 left femurs from Rothwell, the average angle of which is 126 degrees, and 79 right femurs from the same place with an average angle of 127 degrees, it is evident that the neck is less oblique than it is in an average mediæval Englishman, though there is no difficulty in picking out a considerable number in the Rothwell collection with necks still less oblique.

The length of the neck is 64 mm. from the fovea capitis to the spiral line, a length which is only 2 mm. below the Rothwell average.

The lesser trochanter is large and probably indicates a powerful ilio-psoas muscle, though we were surprised to find that the rough facet or depression on the front of the neck, close to the head, which is present in 79 per cent. of the Rothwell left and right femurs, is absent in this specimen. This facet we are inclined to believe is produced by the pressure of the iliacus muscle during extension of the hip joint, but its causation is still under discussion.

The transverse diameter of the shaft at its narrowest point is 24 mm. This we regard as of great importance as giving a clue to the physique of the possessor.

¹ F. G. Parsons, "The Characters of the English Thighbone," *Journ. Anat. and Phys.*, vol. xlviii, p. 238.

The average for 105 of the Rothwell male bones is 30 mm. and we cannot find a single example of a bone so slender as this in the whole collection. There is little tissue lost by erosion; indeed, not as much as is often the case with the bones in the damp crypt at Rothwell; and we feel sure that this marked deviation from our standard of comparison indicates an individual far below the mediæval or modern Englishman in physical proportions and muscular power.

The greatest antero-posterior diameter of the shaft is 31 mm., indicating the development of the linea aspera. This is about the average of the Rothwell bones.

The amount of antero-posterior bowing we estimate by laying the bone flat upon the table and noticing that the point of greatest convexity is 60 mm. above the surface of the table. This bowing, however, must be taken in relation with the length of the bone. We have therefore constructed an index of bowing by dividing the oblique length of the bone into the amount of bowing multiplied by 100. Estimated in this way the bowing index of the Cheddar man is 140, while ninety-five left male Rothwell femurs average 135, so that this bone is slightly more bowed than that of the normal of mediæval Englishmen. The platycnemic index is 90, which indicates that the bone is far from platycnemic, the average of 105 left male Rothwell femurs being 81; still, there is evidence of the outer flange so well-known to physical anthropologists, showing that the pull of the vastus externus has produced some effect, though the antero-posterior thickness of the bone masks this in the index.

The transverse width of the lower articular end is 79, against 77 in ninety-two left male Rothwell femurs. This, in comparison with the length and slenderness of the bone, gives a wide and ungainly spread to the lower end which is quite appreciable to the educated eye in the photograph. We have never yet met with a breadth of 79 mm. in the lower end of any female, femur, and regard it as conclusive evidence of this being a male.

The left tibia has both its articular ends destroyed, so that it is impossible to estimate the length of the bone, but since the width of the upper end always corresponds closely with that of the lower end of the femur, we may be sure that it was somewhere about 79 mm. The bone is markedly platycnemic, its width, about an inch below the nutrient foramen, being 22 mm. and its antero-posterior measurement at the same spot 37, giving a platycnemic index of 59.5. These measurements differ a little from Mr. Davies' 20 and 38 mm. The orthodox level at which to take them is the nutrient foramen, but as this was broken away it is unlikely that we chose exactly the same spot.

Unfortunately we have no long series of measurements with which to contrast this, but the photographs (Plate XXV, Fig. 2) show how extremely narrow the bone was. A piece of wire in the photograph shows the point at which the measurements were taken.

The upper view of the right astragalus shows the presence of the "squatting facet" on the outer side of the upper surface of the neck. This facet one of us

has found very common in Bronze Age as well as Anglo-Saxon bones. It was first pointed out by Charles, in Punjabis (*Journ. Anat. and Phys.*, vol. 28, p. 15) and its presence indicates that a like facet was present on the front of the lower end of the tibia.

A part of the left os innominatum has been preserved (Plate XXV, Fig. 1) and shows that the epiphysial line for the crest of the ilium is not completely closed. This line is of considerable diagnostic importance in determining the age of the possessor, since it remains unobliterated for some few years after all the other epiphysial lines have closed. As all the other available epiphysial lines have disappeared in this skeleton we should say that death took place between the ages of 24 and 28, and this is quite in harmony with the evidence of the skull.

THE UPPER EXTREMITY.

The left clavicle is 136 mm. long. We find, after taking the shoulder width of fifty modern Englishmen, and later on measuring their clavicles cleaned and dried, that the ratio of the clavicular length to the shoulder width is .38, and that there is no great individual variation. As the investigation is still going on, we may have to alter this ratio a trifle, though there seems little likelihood of it at present. Assuming, however, as we believe is the case, that we have practically reached the average ratio of clavicular length to shoulder width, this Cheddar man would have been 357 mm., or a trifle over 14 ins., across the shoulders if measured with a sliding scale from the upper part of one deltoid to the upper part of the other. As a contrast to this we found that fifty Englishmen of the lower classes averaged 397 mm., or over 15½ ins.

The contour (Plate XXV, Fig. 2) shows that the bone is a comparatively straight one, and there is little reason to believe that powerful pectorals had exerted their influence on the anterior convexity.

The left humerus (Plate XXV, Fig. 2) is 321 mm. long. The only data with which to contrast this is that Hrdlička found the average length of the humeri of 100 white males in New York was 324 mm.; while we found that the humeri of eleven different male dissecting-room subjects in St. Thomas's Hospital averaged 329 mm.

According to Pearson's chart a humerus of 321 mm. would give a body stature of 163.5 cm. or 5 ft. 4½ ins., which is exactly the height that the length of the femur gives us. The humero-femoral index $\frac{(H \times 100)}{F}$ is 73, which, when we remember that a single specimen is being dealt with, is very close to the average of 71 which Duckworth gives for adults, presumably of modern European races. The transverse axis of the humeral head is 41. Dwight¹ gives 44.6 mm. as the average of modern white people in America, so that this measurement confirms the others in indicating that the individual was not up to our modern standard of physique.

¹ "Size of the Articular Surfaces of the Long Bones as Characteristic of Sex," *American Journal of Anatomy*, vol. iv, No. 1, p. 19.

The narrowest transverse diameter of the humeral shaft, like that of the femur, we believe will prove a useful indication in the future when we have more data with which to compare it. It was 18 mm., while in eleven male dissecting-room humeri it averaged 22.

The left radius was broken in half, but the two pieces fitted perfectly (Plate XXV, Fig. 2). Its length was 246 mm. which, according to Pearson's chart gives a stature of 166 cm. or 5 ft. 5½ ins.

The radio-humeral index $\frac{(R \times 100)}{H}$ therefore is 77, which brings this individual into Turner's mesati-kerkic group to which the Negroes, Australians, and Polynesians belong. We are not inclined, however, to lay very much stress on this index in a single individual, but rather to record it for future reference.

It is interesting to compare the Cheddar long-bones with those of a male skeleton described by Professor W. J. Sollas, from another British cave. This latter, locally known as the "Red Lady of Paviland," is believed to be of Aurignacian age, and, while the Cheddar man was some 5 ft. 5 ins. tall, with very slender bones and a humero-femoral index of 73, the Paviland man was about 5 ft. 7 ins., also with slender bones and a humero-femoral index of 71. As far as the anatomical evidence goes there is no reason why the Paviland skeleton should not have been an Aurignacian of small stature, while the same evidence would justify us in calling the Cheddar man Magdalenian, River Bed, or Neolithic. In each case the final verdict depends on whether the surrounding artifacts are of the same date as the skeleton.

We may end this paper by stating our belief that, in spite of the absence of extended and precise stratigraphical observations, the facts that we have adduced warrant the deduction that in the Cheddar skeleton we have the remains of a man who lived during the Magdalenian period; the reasons upon which we base this opinion are briefly as follows:—

- (i) Disregarding specimens dating from the metal and even the Roman period, the majority of the implements that have been found in Gough's Cave are of the late palæolithic (Magdalenian) type.
- (ii) Among these there is the part of a *bâton-de-commandement* made of reindeer antler.
- (iii) The fauna recovered from the cave is undoubtedly palæolithic, and includes the bones of rhinoceros, bear, hyæna, *Bos*, *Equus*, etc.
- (iv) The human skeleton was found under a layer of stalagmite (above which were six inches of more recent deposit) in close association with flints of late palæolithic type, and it is said that the *bâton-de-commandement* was also found in association with the skeleton.

We may add that—

- (v) The skeleton is that of a young adult male whose stature was about 5 ft. 4½ ins.

The cranium shows a fairly close resemblance to that of the River Bed type, as



FIG. 2.—CHIEDDAR MAN *NORMA FACILIS*



FIG. 1.—GOUGH'S CAVE, FISSURE SHOWING ARTICULAR FACET OF TIBIA AND
OTHER BONES *IN SITU*.

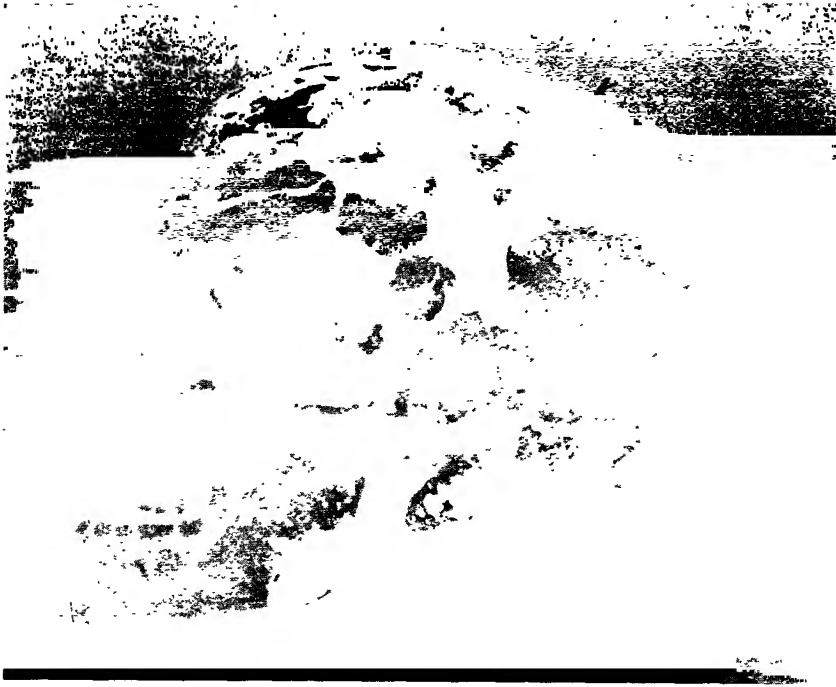


FIG. 1.—CHEDDAR MAN, *NORMA LATERALIS*.

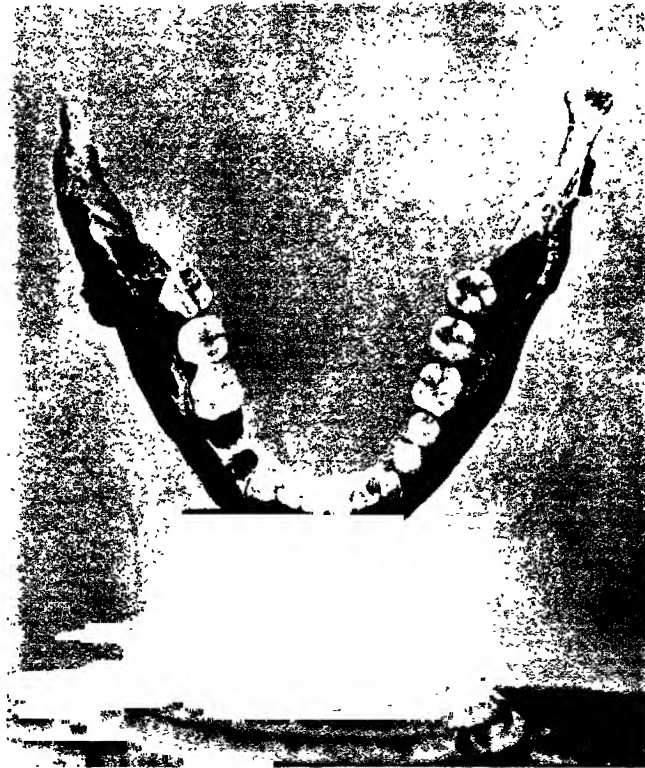


FIG. 2.—CHEDDAR MAN, LOWER JAW.

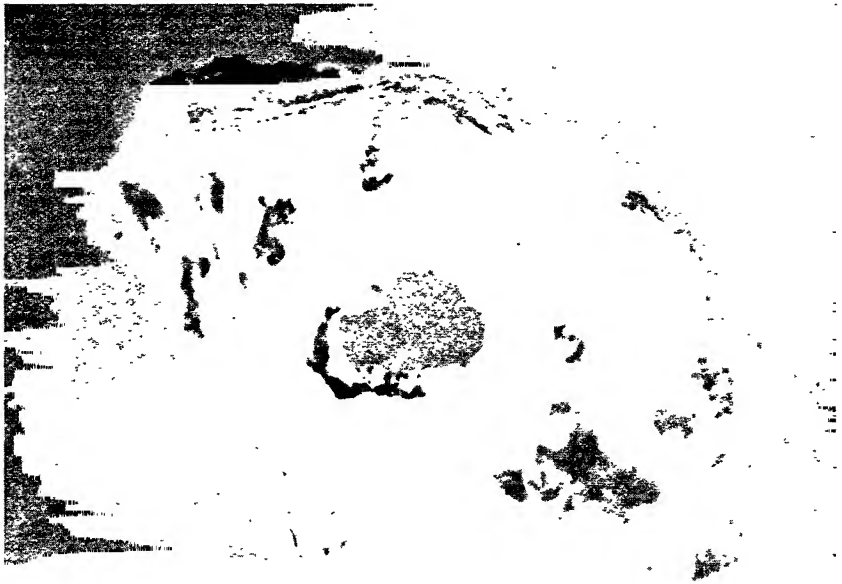


FIG. 1.—CHEDDAR MAN, HIP.

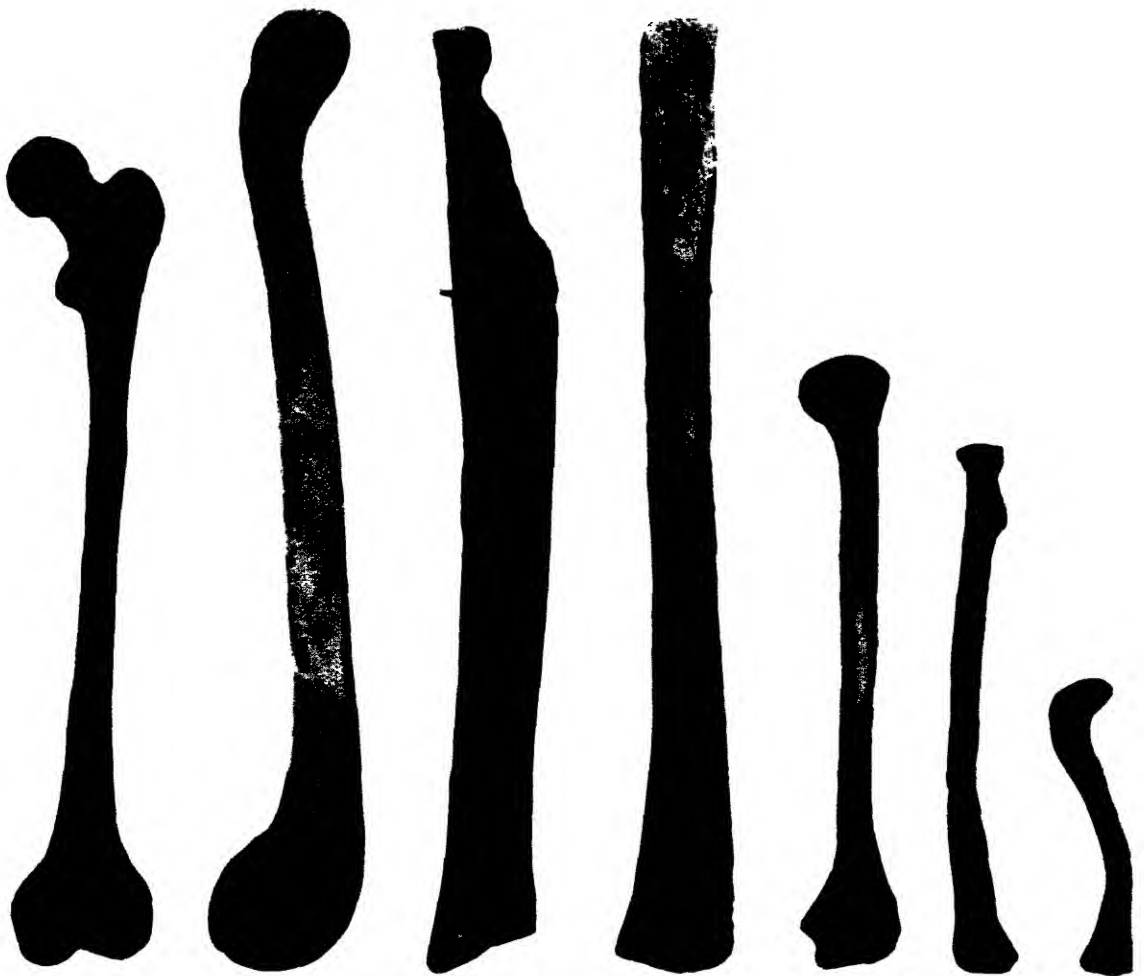


FIG. 2.—LIMB BONES OF CHEDDAR MAN.

well as to that of the neolithic people from Coldrum. In the present state of our knowledge we are inclined to regard the neolithic people as direct descendants of the River Bed race who had acquired the habit of raising stone monuments, and of burying their dead under long barrows. The resemblance between the side view of the Cheddar skull, and that of three representatives of the Magdalenian period of culture, suggests that in the Magdalenian epoch the River Bed race inhabited England and the western parts of the Continent.

There are marked contrasts between the Cheddar skull, and the two Aurignacian skulls with which we are familiar, though we cannot help laying a good deal of stress on their resemblance in the width of the orbits and the consequent low orbital index. We believe that the neolithic people also had a low orbital index though we have not had the opportunity of collecting enough data to allow us to speak definitely on this point.

Although the face and the cranium, except that the latter is long, differ rather markedly from those of the Saxons, the cranium alone could not, we think, be distinguished from that of a mediæval Englishman. The face and orbits, however, are very different, and it is quite an unusual thing to find an English skull with an orbital index of 800.

We are therefore inclined to regard the similarity of the crania of the Cheddar man and of the mediæval English, not so much as a sign of racial affinity as an indication that among the latter a cranium closely resembling that of the River Bed race had been produced incidentally by numerous crosses.

It may, of course, be objected that there is a possibility of the Northamptonshire crania not being those of typical Englishmen of the Middle Ages, since it is known that in the neighbouring county of Bedfordshire there are still areas where small, dark, long-headed people abound who are believed to have preserved neolithic characters with little change. In reply to this, we can claim that one of us has worked through two other large collections of English skulls—at Hythe and at Dover—and, if we take away the curious short skulls at Hythe, the others, with the Dover skulls, are almost identical in their contours with those of Rothwell.

CAVE EXPLORATION AT GIBRALTAR IN 1912.

By W. L. H. DUCKWORTH, M.D., Sc.D., Cambridge.

ABSTRACT OF A PAPER READ BEFORE THE INSTITUTE ON 20TH FEBRUARY, 1913.

The renewal¹ of permission to conduct cave exploration at Gibraltar, enabled me to resume² work on September 20th, 1912.

A group of caves on the Mediterranean side of the Rock was first explored, and I was engaged for a short time upon a further investigation of the Judge's Cave, Glen Rocky.

1.—*Cave S₂* (Fig. 1).



FIG. 1.—ENTRANCE TO CAVE S₂, GIBRALTAR, 1912.

¹ My thanks are due specially to H.E. the Acting-Governor (Sir Frederick Evans, K.C.B.), H.M. Attorney-General (H. B. T. Frere, Esq., K.C., LL.B.), Major J. W. S. Sewell, R.E., Lieutenant E. H. Palmer, R.E., and H. J. King, Esq. Since this report was prepared for publication, several changes have occurred in appointments at Gibraltar, so that the foregoing styles are not correct in 1915. I prefer to leave them as they were in 1912.

² See "Cave exploration at Gibraltar in 1910 and 1911," *Journal of the Royal Anthropological Institute*, vol. xli, 1911, and vol. xlii, 1912.

This cave is situated 710 feet above sea-level on the Mediterranean side of the Rock. Its position can be determined precisely on a plan of the Rock by means of the South Tunnel on the Mediterranean road. In projection the two ends of the tunnel are equidistant from the cave. The distance (in projection) is 80 feet to the east of the tunnel.

Cave S₂ is close to another cave, which I identify with the "Fig-tree Cave," excavated by Brome as described by Busk (*International Congress of Prehistoric Archaeology*, 1868). Brome made a slight excavation in a cave near his Fig-tree Cave but "nothing was found." But although Cave S₂ may have been the one in question, I decided to excavate its floor. Four workmen were supplied to me through the good offices of Major Sewell, R.E., and Lieutenant Palmer, R.E.

The plan (Fig. 2) exhibits the method employed for dividing the area of the floor into sections. These were for the most part metre-squares, but smaller sections had to be recognized, and the whole series of these sub-divisions was numbered from 1 to 67.

Each square metre was subdivided into vertical zones or strata. These zones were distinguished by letters. Thus zone A extended from the surface to a depth of $\frac{1}{4}$ -metre, zone B from $\frac{1}{4}$ -metre to $\frac{1}{2}$ -metre, and so on. Every object found was marked and recorded according to (1) the section, (2) the zone in which it lay. For example, the mark 4 (A) on a sherd indicates that it lay in the uppermost zone (A) of metre-square No. 4.

The sectional drawings (Figs. 3, 4, and 5) will give an idea of the general form of Cave S₂, and of the depth to which the excavations were carried.

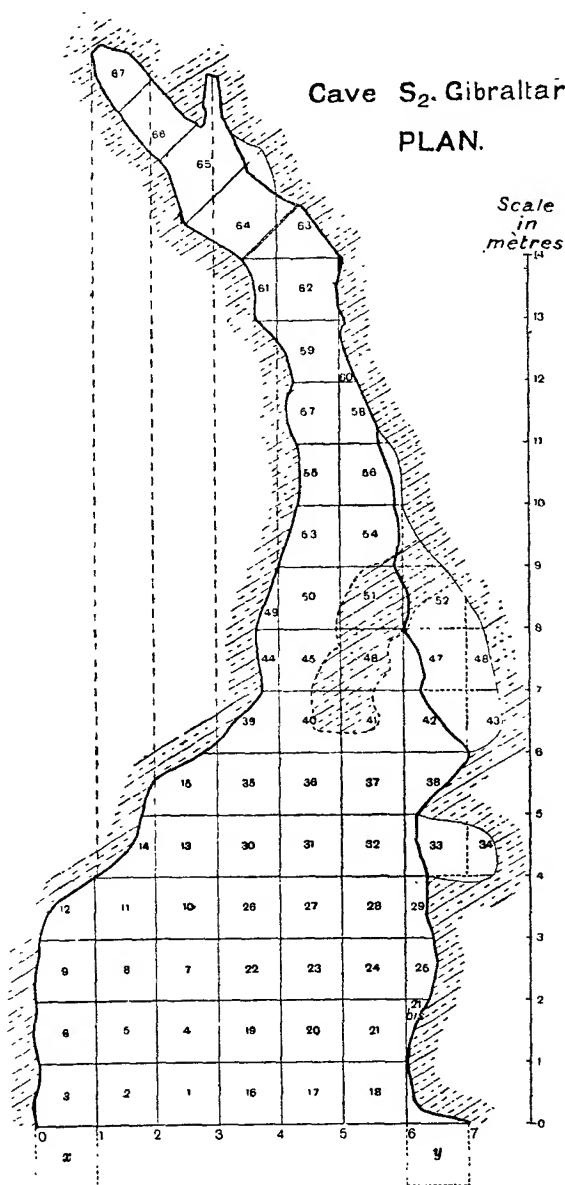


FIG. 2.—FLOOR PLAN (TO SCALE) OF CAVE S₂, SHOWING THE DIVISION INTO AREAS.

The objects found have been classified as follows :—

- I. Pottery.
- II. Stone objects and implements.
- III. Metallic objects.
- IV. Remains of animals (bones and shells).

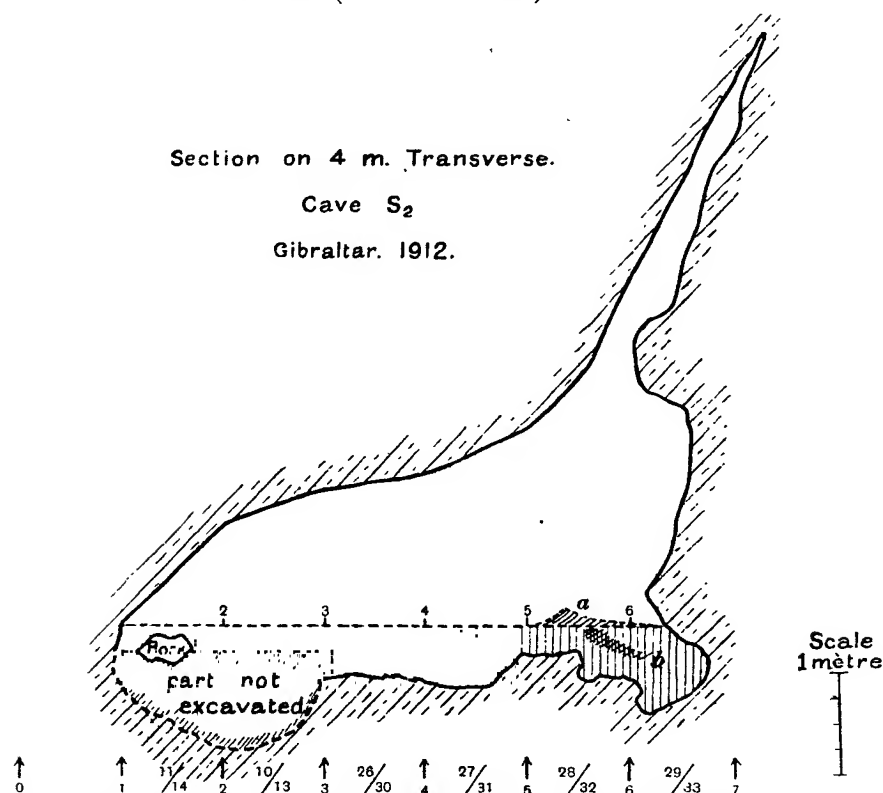


FIG. 3.—VERTICAL SECTION OF CAVE S₂, GIBRALTAR, TO SHOW THE METHOD OF EXCAVATION.

I. POTTERY.

Zone A yielded 83 fragments, the deeper zones providing 17 fragments. They came from all parts of the cave. No single vessel could be completely reconstructed, and 100 fragments represent about 30 vessels, no less than 13 varieties of rim being observed.

Special examples :—

- (i) A sherd from 33 (A) (*cf.* Fig. 2 plan) resembling closely the vessels from the Cueva de la Lobrega¹ and the Cueva de la Mujer¹ in Andalucia, and from Parazuelos² in South-East Spain.
- (ii) A sherd from 4 (A) resembling neolithic ware from the great cave near Jiméra.
- (iii) Other specimens referable to the Bronze Age or later periods.

¹ Cartailhac. *Âges préhistoriques de l'Espagne et du Portugal*. Fig. 71.

² Siret. *Les premiers âges du métal dans le Sud-Est de l'Espagne*. Plate VIII.

II. STONE OBJECTS AND IMPLEMENTS.

Out of about 250 fragments of stone foreign to the rock of the cave, about 10 per cent., *i.e.* 25, are certainly implements. The material is chert in most instances.

Special examples :—

- (i) A polished adze (found on the surface at the entrance to the cave) is referable to the Bronze Age. In shape and in regard to its material (greenstone) it resembles certain specimens from the *Ægean* area.
- (ii) Two palæoliths of small size.
- (iii) Tardenoisian and Flénusian types occur.

On the whole, the general “facies” differs completely from the neolithic industries of South-East Spain (Breuil).

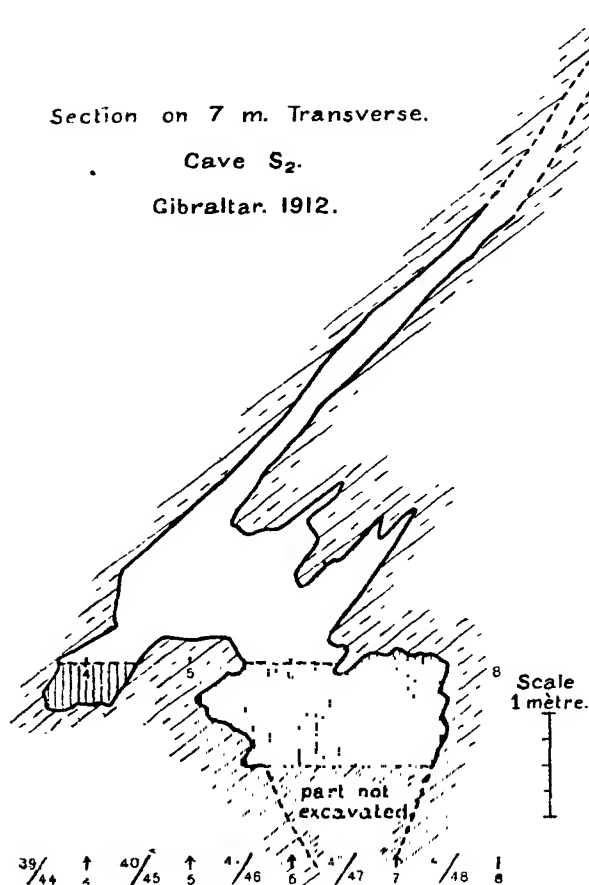


FIG. 4.—VERTICAL SECTION OF CAVE S₂, GIBRALTAR, TO SHOW THE METHOD OF EXCAVATION.

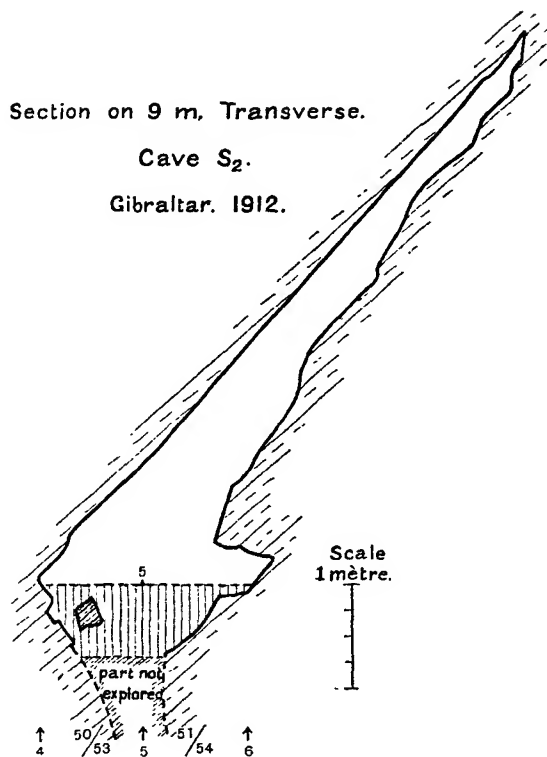


FIG. 5.—VERTICAL SECTION OF CAVE S₂, GIBRALTAR, TO SHOW THE METHOD OF EXCAVATION.

III. METALLIC OBJECTS.

(i) A large bronze adze remarkable for the paucity of tin in its composition. (Copper, 97 per cent.; lead, 2·88 per cent.; tin, ·05 per cent.) It resembles other specimens found in the Iberian peninsula.

(ii) The pin of a fibula (copper, 92·72 per cent.; tin, 7·25 per cent.), providing a marked contrast with the previous object in point of composition. This pin may be of "Roman" date, though it has its counterparts at La Tène. Similar examples have been recorded already in Spain or Portugal.

IV. REMAINS OF ANIMALS.

(i) *Human bones*.—These occurred in 28 out of 67 spaces on the floor (*cf.* Fig. 2). Their antiquity is probably not great.

(ii) *Other mammals*.—The bear deserves mention.

(iii) *Birds*.—About a dozen kinds, but all are still found in the vicinity.

(iv) *Other vertebrates*.—A large toad is worth notice. No previous record of such an amphibian is extant so far as the Rock is concerned.

(v) *Invertebrata*.—No less than fourteen varieties of marine mollusca were found, but all are still found in neighbouring seas. In view of the great height (710 feet) of the cave above the sea-level, it is almost certain that these molluscs were introduced by human inhabitants of Cave S₂.

2.—*Fig-tree Cave* (Brome).—A neolithic flake was found in this cave.

3.—*Cave S₃*.—This cave is entered from a point about twelve feet above the pathway leading to Martin's Cave (*cf.* Busk, *op. cit.*). It consists of a spacious chamber with a very narrow entrance, and with a sloping gallery leading off from it. Only a preliminary excavation was possible. Some bones of an ox were found.

4.—*Glen Rocky* and the *Judge's Cave*.

Two ossiferous fissures were discovered in the garden of the villa known as Glen Rocky. Marine shells and various vertebrate remains of no special significance were found. Sherds of coarse hand-made ware suggest that the fissures had once been occupied by man.

The Judge's Cave is described in some detail by Busk (*op. cit.*).

It is a "fissure-cave" and a descent is possible to a point about 180 feet below the surface. Small deposits of cave-earth are met with much sooner (*cf.* the rough sketch plan, Fig. 6), and three of these were examined.

Primitive neolithic ware, a slate armlet, and human bones testify to the former presence of human occupants.

Various bones and marine shells were also found.

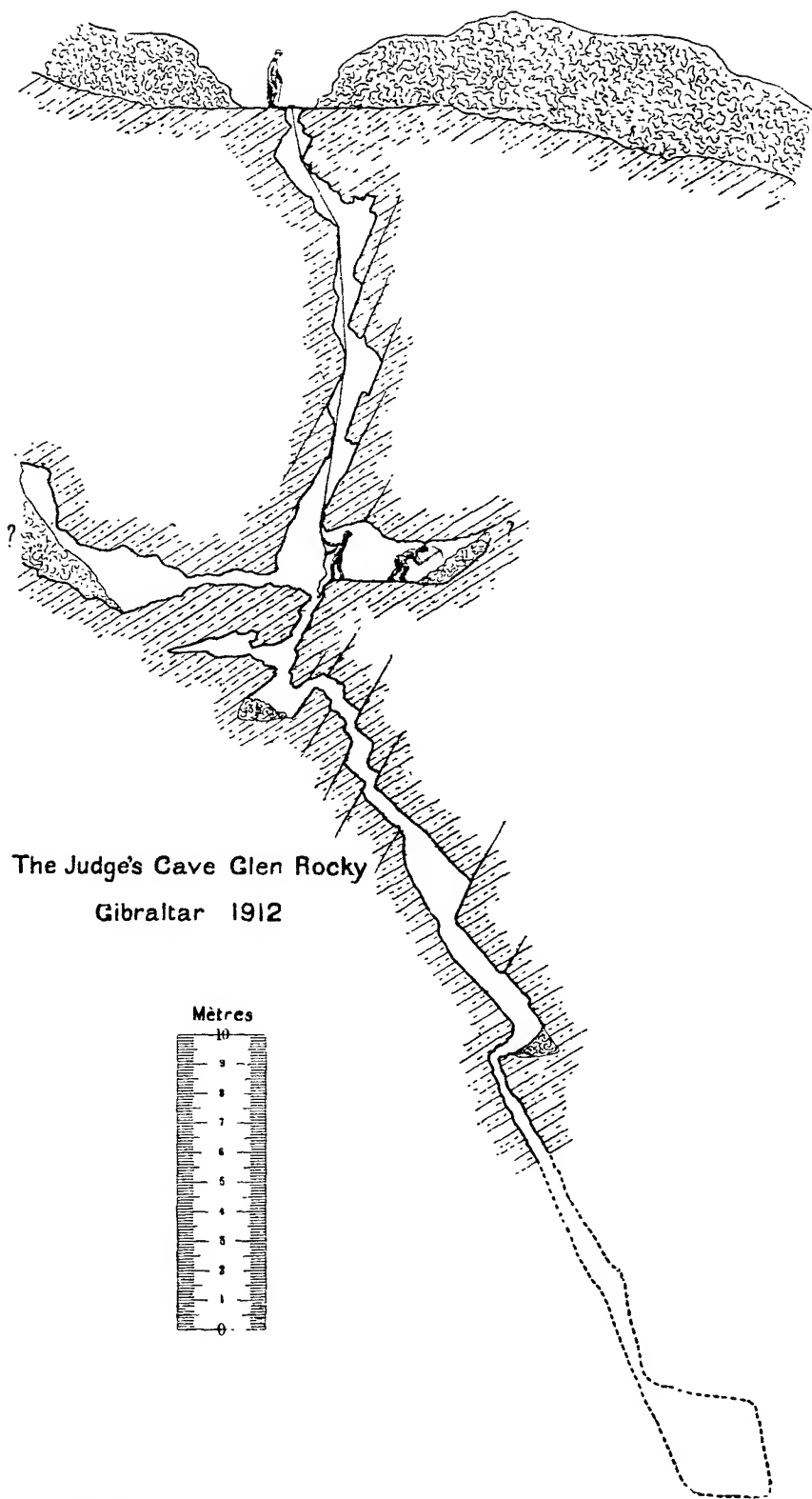


FIG. 6.—DIAGRAMMATIC SKETCH (TO SCALE) OF THE JUDGE'S CAVE, GLEN ROCKY, GIBRALTAR, WITH INDICATIONS OF "POCKETS" WHERE EXCAVATION IS POSSIBLE. THE DISTANCE TO WHICH THE CAVE EXTENDS DOWNWARDS IS UNKNOWN.

THE STABILITY OF CASTE AND TRIBAL GROUPS IN INDIA.

By W. CROOKE.

THE untimely death of Sir H. Risley, and the approaching publication, under my superintendence, in a memorial edition, of his important work, *The People of India*, suggest the discussion of the stability or instability of the larger existing caste or tribal groups in India, in connexion with the problem of the origin and inter-relation of the physical types.

Though recent investigations may have had the effect of modifying the scheme of race classification formulated in the Census Report for 1901, I gladly bear testimony to the value of the work of my lamented friend. This was the first systematic attempt to group the peoples of India on scientific principles. His report, compiled during the inevitable distractions incident to the enumeration of a population of some 300 millions, was a notable performance, and will remain one of the classics of Indian anthropology. No one would have been more ready than Risley himself to admit that pioneer work of this kind could not attain permanence, and was liable to modification in the light of fuller knowledge.

One of the main assumptions on which this classification was based is that India presents unique opportunities for the application of anthropometry to the solution of ethnic problems. To use his own words:—"Nowhere else in the world do we find the population of a large continent broken up into an infinite number of mutually exclusive aggregates, the members of which are forbidden by an inexorable social law to marry outside of the group to which they belong . . . In this respect India presents a remarkable contrast to most other parts of the world, where anthropometry has to confess itself hindered, if not baffled, by the constant intermixture of types obscuring and confusing the data ascertained by measurements."¹

It is the object of the present paper to examine this doctrine, and to consider how far the information collected since these words were written supports these conclusions. Theoretically, of course, the laws of endogamy and exogamy control the tribal and caste groups; but we are now, I venture to think, irresistibly led to the conclusion that any attempt to sort out the existing races into a set of pigeon-holes, each representing a defined type of race, is, in the present state of our knowledge, impossible. The measurement statistics at present available are scanty in comparison with the immense numbers and complexity of the Indian peoples

¹ *The People of India*, 1908, pp. 24 *sqq.*

and in many cases these measurements have been carried out in haphazard ways, without recognizing the diversified character of the groups under examination.¹ The main racial types are, of course, easily recognizable. No one possessed of any powers of observation can fail to distinguish a true Gorkha from a true Kāshmirī Brāhman, a Bengali from the jungle folk of the Nīlgirī Hills. But when we speak of groups like Aryan or Dravidian no one can fix the ethnical frontiers with precision, because on the borders of each group we find masses of people possessing what may be termed intermediate physical characteristics. The position is exactly the same as in Western Europe, where the term Aryan has practically disappeared from our scientific vocabulary, and words like Celt, Iberian, or Aquitanian are now understood to represent mixed races, the origins of which may go back to neolithic or even palæolithic times. Further, since the conquest of Gaul by Cæsar the traces of numerous invaders or immigrants can be identified among the modern French.² The study of place-names in Northern Europe leads to similar conclusions.³

Except for short periods—those of Asoka, Harsha, the early Mughals, the British supremacy—India, especially the northern plains and the Deccan, has been the scene of constant war and rapine. During these ages of unrest, dispersion of the population, the intermingling of racial types, violation of women, slave-driving must have been the normal condition of existence.

Other causes, which are traceable at the present day, contribute to the same result.

In the first place, it is now generally recognised that the formation of endogamous groups is comparatively modern, and even in the time of Manu, the third century of our era, the prohibition against marrying outside the group was in certain cases relaxed. The early "colours" (*varna*) were only an imperfect foreshadowing of the present system; changes of the groups were common, and the law of *connubium*, among the Dravidians at least, seems to have been based not on the group of agnates, but on the village.⁴

Secondly, at the present day, the prevailing moral laxity promotes miscegenation. Here it is preferable to quote a competent native authority, Pandit Harikishan Kaul, Census Superintendent, who thus writes of the Punjab: "It is an open secret that laxity of morals prevails amongst all classes of society to a large or small extent. The menial classes do not as a rule take serious notice of the looseness of their women's character, and there are certain castes like the

¹ The conclusions of Sir T. H. Holland (*Journ. Roy. Anthropol. Inst.*, xxxii (1902), pp. 96 *et seqq.*) on the Kanets, are vitiated by his failure to discriminate between the mixed and the unmixed groups (see H. A. Rose, *Glossary of the Tribes and Castes of the Punjab and North-West Frontier Province*, 1911, vol. ii, pp. 456 *sqq.*).

² T. Rice Holmes, *Cæsar's Conquest of Gaul*, 2nd ed., 1911, pp. 257 *sqq.*

³ Isaac Taylor, *Words and Places*, 1907, pp. 102 *sqq.*

⁴ T. Rhys Davids, *Buddhist India*, 1903, pp. 55 *sqq.*; E. A. Gait, in J. Hastings, *Encyclopædia of Religion and Ethics*, vol. v, 1910, pp. 234 *sqq.*; V. A. Smith, *Caste in India, East and West*, June, 1913.

Pernas, Mirāsis, etc., whose women make a profession of prostitution. But even among some castes who do not connive at such liberty, for instance the Pathāns and Jāts in the Western Punjab, a son born to a wife during her elopement is not disowned by her husband, if she eventually comes back to his protection. There are instances of such a son born from a lover during a wife's abduction having inherited the property of his mother's lawful husband. In the castes, Hindu or Muhammadan, which do not allow widow-marriage, the son has to be owned of necessity in such cases."¹ To this may be added the cases, now sporadic, but probably under old conditions more frequent, in which the *jus primæ noctis* was enforced. In the South-East Punjab, in the days of Rājput ascendancy, the village over-lords used to levy seignorial rights from virgin brides.² The same custom prevailed among the Kols settled in native states on the Vindhyan-Kaimūr Hills.³ The remarkable type of *tali-kettu* marriage in Southern India has, with some probability, been explained as a relic of the days "when the Nambutiris were entitled to the first-fruits, and it was considered the high privilege of every Nāyar maid to be introduced by them to womanhood."⁴

The instructive catalogue of offences against caste discipline prepared by Mr. Blunt in the United Provinces,⁵ proves, if proof were needed, that among the lower castes of the Plains concubinage with alien women is far from uncommon. Such unions are naturally, as a rule, carried on *sub rosa*; but when a scandal comes to light, the Panchāyat or caste council takes action, fines the offender, and in the event of his failure to make due submission, expels him from the community. But here wealth and social position exercise their usual influence. While the poor man, or one who is not supported by an influential body of brethren, has to pay the penalty of his sin, the richer offender is able to defy popular censure. The council, again, is weak or non-existent among the higher groups, and the control of morals is left to the Brāhman or the Guru, "the spiritual pastor," as he has been called, both of whom are little inclined to deal harshly with a wealthy parishioner who can afford to close their mouths by liberal payment of dues, by building or endowing a temple, by making a pilgrimage, or by some other mode of putting himself right with the religious leaders of the community.

Among the hill tribes and many menial castes in the Plains prenuptial infidelity is recognized or tolerated. It is true that this refers only to members of the group, and an intrigue with an alien is sharply punished. Women, once married, are said to be generally chaste, but the relaxation of moral control in early life must inevitably suggest miscegenation.⁶

Facts such as these are familiar to all experienced magistrates and observers

¹ *Census Report, Punjab, 1911*, vol. i, p. 293.

² Rose, *op. cit.*, vol. ii, p. 284.

³ W. Crooke, *Tribes and Castes of the North-West Provinces and Oudh*, 1896, vol. iii, p. 299.

⁴ E. Thurston, *Castes and Tribes of Southern India*, 1909, vol. v, p. 326.

⁵ *Census Report, United Provinces, 1911*, vol. i, pp. 337 *et seqq.*

⁶ See *Census Report, Baluchistan, 1911*, pp. 105, 107.

of village life. A common proverb lays down that the causes of quarrels are *zan, zar, zamīn*, "woman, money, land," and woman is rightly placed first.

Thirdly, caste has been modified by the direct action of the Rājā. This is authorized by the Laws of Manu,¹ and still survives in those native states which follow the ancient Hindu model. For instance, in the kingdoms of Cochin and Travancore, when a Nambūtiri Brāhman woman is accused of infidelity, a commission is appointed by the Rājā, whose representative attends the inquiry, watches over the proceedings, preserves order, and reports the verdict to the Rājā, who, in the event of a conviction, issues orders excommunicating the woman and those found guilty of criminal intimacy with her.² In Manipur, the Rājā is the only authority competent to pass final orders on questions affecting social status.³ In Kapadvaj and Broach there are traces of an ancient feudal system, with a presiding Thākūr, who convenes the meetings of the committee, and acts as a final Court of Appeal, while in Cutch serious cases in connexion with caste are submitted to the State authorities for trial.⁴

From the exercise of this power of interference the transition to the direct use of the royal power in promoting persons from one group to another is easy. In Manipur, for instance, certain inferior groups are now desirous of admittance into the ruling section, the Meithei. The first step is to abandon the use of articles of food and drink which are supposed to cause pollution. Then, after a period of probation, the candidate obtains from the Rājā permission to wear the Brahmanical cord. Up to quite recent times, the Rājā, the Court Brāhmans, and members of the royal family used to confer the right to wear the cord without discrimination. But at the present day most people prefer to receive it directly from the Rājā himself. The Brāhmans, however, are now becoming more influential, and it is less easy to secure admission into the sacred order.⁵ The Rājā of Bastar, a jungle potentate in the Central Provinces, claims the right to confer the sacred thread on men of low rank, and, with a nice consideration for their feelings, he used to present it as a solatium to offenders whom he had occasion to fine for offences against law or religion.⁶ Two years ago, in the Census Camp, a Gond was found wearing the Brahmanical cord, a privilege which he had obtained by paying a fee of Rs. 50 to the Rājā.⁷

Turning to the Himālaya, the Kolis, whom Hindus in some parts of the hills treat as outcasts, have repeatedly attempted to induce the Katoch Rājā to remove the ban and raise them to respectability. The negotiations have so far failed

¹ viii, 41-46.

² *The Cochin State Manual*, 1911, pp. 341 *et seq.*: *Census Report, Madras*, 1911, vol. i, p. 180; L. K. Anantha Krishna Iyer, *Tribes and Castes of Cochin*, vol. ii, 1912, pp. 55, 211; Thurston, *op. cit.*, vol. ii, p. 316, vol. v, p. 296.

³ *Census Report, Assam*, 1911, vol. i, p. 121.

⁴ *Census Report, Bombay*, 1911, vol. i, pp. 201, 254.

⁵ T. C. Hodson, *The Meitheis*, 1908, pp. 84 *et seq.*

⁶ E. A. de Brett, *Gazetteer Chhatisgarh Feudatory States*, 1909, vol. i, p. 63.

⁷ *Census Report, Central Provinces*, 1911, vol. i, p. 239.

because the bribe offered was insufficient.¹ In former times the Rājā of Chamba used to confer the sacred cord on members of the Rāthī caste in consideration of presents and services, and some of them wear it to the present day, while in Kāngra the Rājās claimed the right of promoting a Ghīrth cultivator to the superior grade of Rāthī.²

Similarly, in South India popular tradition describes the wholesale conversion of members of lower castes into Brāhmins. This occurred when a Rājā, in order to expiate his sins, or to gain religious merit, undertook to feed large bodies of the priestly order. If his guests fell short of the number required, he used to send into the highways and hedges and promote from the lower castes as many as he needed. Nowadays some of the more scrupulous Brāhmins look askance on these new-comers, but ordinary people accept them as an inferior order of Brāhmins.³

In the Central Provinces and elsewhere there is a host of semi-Brāhmins in a transitional stage, some of whom have attained Brāhman status, while others are on the road to attaining it.

It would be easy to add to these examples.⁴ The most notorious case is that of Ballāl Sen, who, in the eleventh century, reorganized the whole caste system of Bengal.⁵ At the present day, except in the more remote kingdoms, such interference is less common; in British India an aggrieved person would probably claim an injunction from the Law Courts. But under the older Hindu system the Rājā, as the fountain of honour, freely exercised his right of promoting and degrading as he pleased, and his action must have led to serious disturbance of the caste groups.

These disintegrating influences have produced their natural effect both on tribes and castes.

The tribe is usually regarded as precedent in order of time to the caste, and as more stable in its organization. But many facts militate against this view; and Risley himself admits that the tribe is not necessarily endogamous.⁶ Thus of the Chins of Burma Mr. Webb writes: "The influence on racial development exercised by administration is strikingly illustrated by a comparison of the conditions prevailing in the regularly administered area of the province, and those areas but recently brought under administrative control. In the former tribal distinctions rapidly vanish and racial uniformity begins to extend."⁷ This is particularly the case on the northern frontier, where racial instability "manifests

¹ Rose, *op. cit.*, vol. ii, p. 218.

² *Ibid.*, vol. ii, pp. 256 (note), 289.

³ Thurston, *op. cit.*, vol. i, Introduction, p. liv.

⁴ See, for instance, Sir A. Baines, *Ethnography*, 1912, pp. 20, 32; *Census Reports, Bengal*, 1901, vol. i, p. 365, *Baroda*, 1911, vol. i, pp. 255 *et seq.*, *United Provinces*, 1911, vol. i, p. 119, *Punjab*, 1911, vol. i, pp. 423, 427.

⁵ *Imperial Gazetteer of India*, 1909, vol. vii, p. 210; Sir H. Risley, *The People of India*, pp. 116 *et seq.*

⁶ *The People of India*, p. 61.

⁷ *Census Report, Burma*, 1911, vol. i, p. 267.

itself in various ways, sometimes apparently in contrary directions. In some conditions it works for consolidation, in others for dispersion . . . The Nāga hillmen, when they descend into the plains, show extreme receptivity, and become Shāns or Burmese within a generation." In the same way, through immigration, Chinese influence spreads among the neighbouring tribes. "When this idea once takes hold of them, the time is not far distant when they will call themselves Chinamen. A race of Chinese thus grows up who have really no Chinese blood in them."¹ Among the Andamanese, Mr. Lewis tells us, tribal barriers are now disappearing. Though the tribe to which an individual belongs is never in doubt, intertribal marriages are common, the children of these mixed unions being included in their father's tribe.²

In parts of Northern India the tribe is equally unstable. The Baloch *tuman*, according to Mr. Rose, "cannot be regarded as mere tribes. The *tuman* is in fact a political confederacy . . . comprising men of the tribe with affiliated elements from other tribes not necessarily Baloch . . . Baloch women are not given to any outsider in race, save to Sayyids, but a man may marry any Muhanmadan woman, Baloch, Jāt, or even Pathān, but not, of course, Sayyid. The usual practice is to marry within the sept, women being sold out of it if they go astray."³ To quote Mr. Bray: "It is of course well established that not one of the groups now designated as Baloch, Brāhūī, and Pathān, is entirely homogeneous in its composition"; and he criticizes the latest conclusions of anthropometry, which lumps all three together in company with the Jāt and the Dehwār, the Lorī and the Med and the Ghulām—"strange bedfellows with a vengeance—as constituents of one Turko-Iranian race." "There is," he adds, "hardly a Pathān tribe which does not make shift to explain the presence of this or that section in its midst as the descendants of some adopted son, or of some fugitive from another tribe, or—most pathetic of all his confessions of ignorance—of some foundling."⁴ In the same province the Jāt usually poses as a Baloch, much to the disgust of the Baloch himself. All the main races of Baluchistān have been laid under tribute to swell the numbers of the Dehwār, and the word Baloch implies status rather than race.⁵ Islām is, of course, one of the main solvents of tribal distinctions, a sort of Cave of Adullam where everyone who is discontented, or wishes to marry a woman otherwise barred, takes refuge.

Pandit Harikishan Kaul, writing of the Punjab, quotes the case of a section of Jāts living among Niāzī Pathāns, who have now begun to call themselves not only Pathāns but Niāzī Pathāns, that is to say they have become included not only in the Pathān tribe, but in one of its sections which has a peculiar individuality of

¹ *Census Report, Burma, 1911*, vol. i, pp. 248 *et seq.*

² *Census Report, Andaman Islands, 1911*, vol. i, p. 88.

³ *Op. cit.*, vol. ii, pp. 45, 49.

⁴ *Census Report, Baluchistan, 1911*, pp. 153, 158.

⁵ *Ibid.*, pp. 172, 174, 165; *Census Report, Baluchistan, 1901*, vol. i, pp. 102, 119; D. C. J. Ibbetson, *Punjab Ethnography, 1883*, pp. 195, 201.

its own. It is just as if a Slav emigrant to Scotland not only calls himself a Scotchman, but assumes the title of a Campbell or a Cameron. In another case a Jāt left his village in 1840 and wandered about with the gypsy-like Labānās. On his reappearance in his village the Jāts refused to recognize him as a Jāt, called him a Labānā, and gave him back only a small portion of the tribal land as an act of grace.¹

So with the forest tribes of Central India, on the ethnical frontier where they come in contact with the Hindus, we usually find a ragged fringe, the result of what is called "contact metamorphosis" or miscegenation. Such are the Bhilālas of Central India, half Bhils, half Rājputs, with the vices of both races.² Numerous instances of the same kind are recorded from Southern India. Under these conditions of contact the true jungle Irulas, very dark-skinned and platyrrhine, acquire a markedly paler complexion and a leptorrhine nose.³ The true Sholaga differs from his kinsfolk in the Plains, the nasal index being "higher in the Sholagas and Irulas of the Nilgiri jungles than the more domesticated Irulas of Chingleput." "In brief," says Mr. Thurston, "the two former who have mingled less with the outer world retain the archaic type of platyrrhine nose to a greater extent than the latter. The reduction of platyrrhiny, as the result of civilization and emergence from the jungle to the vicinity of towns, is still further brought out by the figures relating to the two classes of Irulas, and the Kānikars of Travancore, who still lead a jungle life, and those who have removed to the outskirts of a populous town."⁴

So far we have been dealing with tribes. When we come to castes the same condition presents itself. It is now an ethnological commonplace that terms like "Brāhman" or "Rājput" merely imply an aggregate of heterogeneous groups, some exhibiting the delicately moulded face, the tall stature, the "wheat" complexion found among the higher princely families of Rājputāna or among some Kāshmīrī Brāhmans; the other short, coarse featured, dark-skinned people, with many intermediate types. Even among these higher groups the type is liable to degradation. Pandit Harikishan Kaul tells us that "the Kāshmīrī Brāhmans are a very exclusive race, and intermixture of blood has so far been out of the question; nevertheless, cases are in existence in which some of the members of families which migrated from Kāshmīr half a dozen generations back and settled down in the United Provinces, Bengal, or Central India, have become jet black in complexion, and there is not the least difference between their appearance and that of the members of the local castes."⁵

¹ *Census Report, Punjab, 1911*, vol. i, p. 433.

² Capt. C. E. Luard, *Ethnographic Survey, Central India, 1909*, Part II.

³ Thurston, *op. cit.*, vol. ii, pp. 373 *et seq.*

⁴ *Ibid.*, vol. ii, pp. 386 *et seq.*

⁵ *Census Report, Punjab, 1911*, vol. i, p. 441. In Bengal Mr. Gait observes that "the idea that the limits of caste are absolutely rigid and permanent is devoid of foundation," and he gives numerous instructive examples of intermarriages between members of castes supposed to be endogamous.—*Census Report, Bengal, 1901*, vol. i, pp. 351 *et seq.*

In this connexion the state of things in the Himalayan districts is particularly instructive, because we recognize in action at the present day the archaic system which must have prevailed throughout Northern India before the caste organization was consolidated under Brāhman lawgivers, like Manu. For instance, in the Chamba State Brāhmans, Rājputs, Thākurs, and Rāthīs form a single caste, without restrictions of food or intermarriage; Brāhmans in Kāngra marry Khatrīs; Gaddīs form three groups—first Brāhmans, Khatrīs, and Rājputs, who, as a rule, wear the sacred thread; secondly, Thākurs and Rāthīs who, as a rule, do not wear it; and thirdly, a menial caste of labourers and artisans: in Kullu, Brāhmans and Rājputs commonly marry Kanet girls, who are known by a title differing from that assumed by wives drawn from the caste and married by a more regular ritual.¹ Occasionally we find the orthodox marriage rites performed, but when a high-caste man marries a low-caste wife, his personal attendance is dispensed with, his priest and relations take a sword to the bride's house, and to this, as representing the bridegroom, the bride is wedded.² The Bajju sept of Rājputs, until quite recently, practised a custom by which a Mussalmān girl could be turned into a Hindu for purposes of marriage, by temporarily burying her in an underground chamber, and ploughing the earth over her head.³ In Kāngra the son of a Brāhman by a Rājput wife is reckoned a Brāhman.⁴

In many places, again, where owing to hypergamy, or to other causes, brides are in a deficiency and command a high price, the grossest frauds are practised. In Kāshmīr girls of the lower castes are often sold to high-caste people who, if they happen to be of fair complexion, accept them as legitimate brides.⁵ Frauds of this kind are familiar to magistrates throughout Northern India. But for one case which reaches the Courts ten are concealed, because the unfortunate bridegroom, in his dread of the disclosure of a scandal which may force the Caste Council to take action, prefers to accept the situation and raise no protest.

In the Deccan, the Marāthās, like the Rājputs or the Khandaits of Orissa, constitute a military status group, which sprang up within comparatively recent times. The basis of the group is the Kunbī, an occupational, not a racial, group of agriculturists, which has in some cases intermingled with Rājputs. In short, the term implies status rather than race.⁶

Similar instances are abundant in Southern India. The Nāyars, whose strange marriage customs have aroused special interest, are not a caste or even a tribe; they are rather a community including various elements, an aristocratic group, a

¹ Rose, *op. cit.*, vol. ii, pp. 130, 256 *et seq.*, 460 (note).

² *Census Report, Punjab*, 1911, vol. i, p. 270.

³ Rose, *op. cit.*, vol. ii, p. 39.

⁴ *Census Report, Punjab*, 1911, vol. i, p. 433.

⁵ *Census Report, Kashmir*, 1911, vol. i, p. 141.

⁶ *Ethnographic Survey, Central Provinces*, Part IX, 1911, pp. 123 *et seqq.* For the extraordinarily heterogeneous character of the population of Gujarāt, as the result of successive migrations of foreigners, see Sir G. Grierson, *Linguistic Survey of India*, vol. ix, part ii, Calcutta, 1908, p. 324.

group of Sūdrās or menials, including drummers, musicians, potters, funeral priests, and so on. The Tarakans, a class of brokers, have become Nāyars within living memory, and there is another section only partially assimilated, the members of which are refused admittance into the tribal sanctuaries.¹ Regarding the Vellālas, the farmers of the Tamil country, Mr. Thurston writes: "There are nowadays many groups which really belong to quite distinct castes, but which call themselves Vellālas, and pretend that they belong to that caste, although in origin they had no connexion with it. These nominally cannot intermarry with any of the genuine Vellālas, but the caste is so widely diffused that it cannot protect itself against these invasions, and after a few generations the origin of the new recruits is forgotten, and they have no difficulty in passing themselves off as real members of the community. The same thing occurs among the Nāyars of Malabar." His comment on these facts is significant: "It may be imagined what a mixture of blood arises from this practice, and how puzzling the variations in the cranial measurements of Vellālas taken at random are likely to become."²

The case of those South Indian castes which follow the law of mother-right is equally remarkable. The facts are well known and need not be repeated in detail. Suffice it to say that the so-called Kshatriyas are hybrids, the result of the union of Kshatriya women with Brāhmans. Members of the Tirumalpād section in Travancore marry by preference Nambūtiri Brāhmans, but may take husbands from their own caste. The Kshatriya princes of Travancore select their consorts from Nāyar women, and the marriage rite is the same whether the husband be a Brāhman or a Nāyar.³

Again, the existence of slave castes represents a survival from the old period of anarchy. Up to quite recent times slave-driving prevailed among the hill tribes of Assam, and even in our own days it has not quite ceased. Groups which trace their origin to slaves are found in various parts of the country. The Golās in Baluchistan under an able leader have acquired land and wealth. Their claim to Baloch status has almost succeeded, and is admitted by some chiefs.⁴ The Chāchar Jāts of the South-west Punjab, who enjoy full franchise in the tribe, are said to have been originally slaves.⁵ In Kafiristān master and slave occasionally become adoptive brothers, and children born to a Kāfir from a slave mother are free, but of low status.⁶ In Rājputana we find what are called bastard castes, composed of the offspring of Rājputs, Brāhmans, and traders, now recruited from the descendants of such people and from illegitimate children of legitimate parents. Domestic servants and handmaids are largely

¹ L. K. Anantha Krishna Iyer, *op. cit.*, vol. ii, Introduction, pp. xiv *et seq.*, 15, 17, 97; Thurston, *op. cit.*, vol. v, pp. 283, 298, 299, 301.

² Thurston, vol. vii, p. 376.

³ Thurston, vol. ii, pp. 151 *et seq.*, v. 295, vii, 33.

⁴ *Census Report, Bombay*, 1911, vol. i, p. 208.

⁵ Rose, *op. cit.*, vol. ii, p. 145.

⁶ *Ibid.*, vol. ii, p. 426.

drawn from them, and thus by entering the zenana they cause still further mixture of blood.¹ The same condition of things is found in Baroda and in the United Provinces.²

I need not dwell upon the modification of the caste system which is now in progress. Owing to the ill-judged attempt made at the Census of 1901 to compile a precedence list of castes classified according to their social importance, shoals of angry protests have been raised by certain groups dissatisfied with the place assigned to them, and innumerable pamphlets with quotations, many of which are clearly unauthentic, from the Hindu Scriptures, have been published with the same object. The Brāhman ranks, owing to their prestige and careful organization, are now closed against intrusion of this kind. But more heterogeneous bodies, like the Rājputs and the mercantile classes, cannot protect themselves, and candidates for promotion naturally follow the line of least resistance. Some of these claims have been accepted, others have been rejected. But the Census Commissioner of the future, anxious to avoid troublesome controversies, when once an aspirant has gained some kind of footing in a higher rank, will probably accept the appeal, and still further confusion and intermixture will result. Among the Greeks the parvenu became a gentleman in three generations. In India the process will be completed within a shorter period.

These facts, selected from a number of recent authoritative Reports, seem to invalidate the theory that, owing to its unique tribal and caste organization, India, for purposes of anthropometry, occupies a position differing from that of other countries. On the contrary, as might have been expected amidst an oriental environment, the heirs to an historical civilization have been exposed to constant intermixture as a result of war and political disorganization, slavery, laxity of morals, and the peculiarities of their marriage system. It is *prima facie* improbable that the people of the Punjab, the scene of constant invasions—Iranian, Greek, Scythian, Hun, Mongol, Persian—from the days of Darius to those of Nādir Shāh, should have preserved the "Indo-Aryan" type unimpaired by admixture with foreigners. Among the Dravidians Mr. Thurston has failed to identify the typical Dravidian skull. He finds the greatest constancy of type among the Tamil and Malayālam peoples, occupying the great delta and fertile coast area, and thus comparatively isolated. On the other hand, as might have been anticipated, when we move northward, the Tulu, Canarese, and Telugu races exhibit greater variances—a brachycephalic or mesaticephalic type in contrast to the dolicho- or sub-dolichocephalic skull form in the South.³

To take two geographical areas, Burma and Kāshmir—according to the Ethnographical Survey,⁴ the Burmese is the most mixed race in the province.

¹ *Census Report, Rajputana*, 1911, vol. i, p. 249.

² *Census Report, Baroda*, 1911, vol. i, p. 247, *United Provinces*, 1911, vol. i, pp. 351 *et seq.*

³ *Op. cit.*, vol. i, Introduction, pp. xxxvii *et seq.*

⁴ "General Indefinite Characteristics of the Tribes of Burma," *Ethnographic Survey of India*, 1906, p. vi.

"Its ancient kings," we are told, "systematically demanded the daughters of Shān Sawbwās under their political influence; the residents on the banks of a navigable river systematically offered their daughters to Indian or European visitors, and the Chinaman had quite a monopoly of the girls for generations. Originally Dravidians of some sort, they seem to have received blood from various sources—Hindu, Musalmān, Chinese, Shān, Talaing, European, and others." In Kāshmīr we find a race gradually acquiring homogeneity by the absorption of all kinds of ethnical elements, and gradually, as the result of a special environment, acquiring a distinct physical character. The historical review, says the writer of the last Census Report,¹ will serve as a key to the constitution of the population of the valley, and every race and tribe that has ever held sway over the country is found in it even at the present day. This has gone on for centuries in the past, and as a result of the process the Kashmīrī has now become a distinctive race.

I suggest, therefore, that for the purpose of identifying the ethnical elements in the present population of India, the haphazard measurement of a limited number of subjects drawn from the larger groups, Brāhmans, Rājputs, Marāthas, Nāyars, or Vellālas, without careful discrimination of the units from which these groups have been constituted, can be of little scientific value; and it is equally useless to examine groups, like the forest tribes, sections of which are rapidly undergoing modification through contact with the races of the Plains, unless we can trace those units which have hitherto escaped intermixture. It may be possible to select the smaller units, septs or sub-castes, which by careful precautions against irregular unions have maintained the purity of the race. Intensive study of this kind is now enforced by students of religion and sociology, and the application of the same methods may succeed in rendering the results of anthropometry more satisfactory than they appear to be at present.

¹ Vol. i, p. 204.

THE ORIENTATION OF THE DEAD IN INDONESIA.

By W. J. PERRY.

"ORIENTATION" may perhaps be defined as the disposal of an object in a position of definite relationship to some particular direction. The definition is purposely made wide, for, as will be seen, the modes of orientation of an object may vary. It is possible, for example, to orient the body of a dead person in various ways. It may be placed, sitting or standing, to face in some given direction, or it may be placed, lying on its side in an extended or contracted position, also facing the given direction. Again, if a body be interred lying on its back with the head to the west and the feet to the east, then it is probable that this is a case of orientation to the east. I say "probable," for cases occur where the body is placed to lie in a position of definite relationship to its axis and not to the direction in which it is facing. It is only when the aim of the practice is known that it is possible to decide definitely in cases of this kind.

Another case in which it is necessary first to have information upon other points is afforded by the Kuki-Kom of Manipur whose dead are interred on the south side of the village. In the course of this paper it will become evident that this position is definitely related to the south point of the compass, and that the act of placing the body in a definite position relative to the village is really orientation in the sense of the definition.¹

Before proceeding to the demonstration of the aim of the practice of orientation, it will be interesting to mention the two interpretations of the act that have hitherto been current. First, there is that of Professor Tylor. His views will be made clear by the two extracts from "Primitive Culture" which follow.

"The scene of the descent into Hades is in very deed enacted day by day before our eyes, as it was before the eyes of the ancient myth-maker, who watched the sun descend to the dark under-world, and return at dawn to the land of living men. It is by the simplest poetic adaptation of the sun's daily life, typifying man's life in dawning beauty, in mid-day glory, in evening death, that mythic fancy even fixed the belief in the religions of the world, that the land of departed souls lies in the far west or the world below. How deeply the myth of the sunset has entered into the doctrine of men concerning a future state, how the west and the under-world have become by mere imaginative analogy regions of the dead, how the quaint day-dreams of savage poets may pass into honoured dogmas of classic sages

¹ A table is appended which exhibits the results of this paper in tabular form.

and modern divines,—all this the crowd of details here cited from the wide range of culture stand to prove.” . . .

. . . “In discussing sun-myth and sun worship, it has come into view how deeply the association in men’s minds of the east with light and warmth, life and happiness and glory, of the west with darkness and chill, death and decay, has from remote ages rooted itself in religious belief. It will illustrate and confirm this view to observe how the same symbolism of east and west has taken shape in actual ceremony, giving rise to a series of practices concerning the posture of the dead in their graves and the living in their temples, practices which may be classed under the general heading of orientation.

“While the setting sun has shown to men, from savage ages onward, the western regions of death, the rising sun has displayed a scene more hopeful, an eastern home of deity. It seems to be the working out of the solar analogy, on the one hand in death as sunset, on the other in new life as sunrise, that has produced the contrasted rites of burial, which agree in placing the dead in the sun’s path, the line of east and west.”¹

The other hypothesis is that put forward by Herbert Spencer. He says:—

“What changes the idea of another world close at hand, to the idea of another world comparatively remote? The answer is simple—migration.

“The dreams of those who have lately migrated, initiate beliefs in future abodes which the dead reach by long journeys. Having attachments to relatives left behind, and being subject to home-sickness (sometimes in extreme degrees, as shown by Livingstone’s account of some negroes who died from it), uncivilized men, driven by war or famine to other habitats, must often dream of the places and persons they have left. Their dreams, narrated and accepted in the original way as actual experiences, make it appear that during sleep they have been to their old abodes. First one and then another dreams thus: rendering familiar the notion of visiting the fatherland during sleep. What naturally happens at death; interpreted as it is by primitive minds? The other self is long absent—where has he gone? Obviously to the place which he often went to, and from which at other times he returned. Now he has not returned. He longed to go back and frequently said he would go back. Now he has done as he said he would. . . . Migrations have taken place in all directions; and hence, on this hypothesis, there must have arisen many different beliefs concerning the direction of the other world.”²

It will become evident in the course of this paper that the hypothesis of Herbert Spencer is the one which fits the facts.

The first fact that I wish to establish is that the direction of orientation of the dead is the same as that of the land of the dead, that is to say, the body of a dead person is oriented in the direction in which the ghost has to travel.

The survey is confined to Indonesia, that is, the East Indian Archipelago and the Burma-Assam region.

¹ *Primitive Culture*, 4th edition, 1903, vol. ii, pp. 48, 421.

² *Principles of Sociology*, 3rd edition, 1893, vol. i, pp. 201 *et seq.*

The Karo-Batak place the corpse before interment on a stool so as to face towards the west,¹ and they believe that the land of the dead is in the west.² These people have a mode of disposal of the corpse in the grave which is interesting. The bodies of those who die a natural death are placed with the feet towards the village, so that, on rising up, they would look towards the village, while the bodies of those who die a violent death, or the bodies of medicine-men (*Begu*), are placed in the opposite direction.³ This mode of orientation is outside the scope of the present paper, and I do not propose to discuss it.

The Andamanese in some cases place their dead upon a platform so that they face towards the east, where lies their future home.⁴ The mode of disposal among the Badoej of Bantam is to inter the body lying full length on its side, with the head to the west, feet to the east and facing to the south. The land of the dead is called "*Lemah Bados*"—the white spot—and it is situated south of the district which they occupy at present.⁵ In Central Celebes the To-Radja inter their dead in an east-west direction with the head at the east end. The land of the dead is in the west.⁶

In Halmahera the dead are placed to face to the west; the body lies on its side in a north-south direction with the face turned to the west.⁷ Kruijt does not mention whether his information refers to the Galelareeze or to the Tobeloreeze, but concerning the former it is stated that the land of the dead lies in the west for those who have died a natural death, and in the east for those who have died an unnatural death.⁸ Tradition points to Seran, especially East Seran, as one of the places whence the inhabitants of Serangloa and Gorong have come.⁹ Adults are interred lying on their right side with the face turned to the north.¹⁰ The Kei Islanders place the land of the dead on Baer and Ohimas, two islands to the north of the group. The dead are oriented to the north. The body is interred so that the head is to the south and the feet to the north, so that, on rising up, the dead

¹ Kruijt, *Het Animisme in den Indischen Archipel.*, 1906, p. 371.

² *Ibid.*, p. 375.

³ *Ibid.*, p. 371. J. H. Neumann, "De Begu in de godsdienstige begrippen der Karo-Batak in de Doesoën." *Mededeelingen van wege van het Nederlandsch Zendelingsgenootschap*, xlv, 1902, p. 27.

⁴ E. H. Man, *Journ. Roy. Anth. Inst.*, xii, p. 141.

⁵ Kruijt, *Animisme*, p. 373; Jacobs, *De Badoeys*, p. 8; S. A. Buddingh, *Neerlands Oost-Indie*, 1859, vol. i, p. 61; L. von Ende, "Die Baduwis auf Java" *Mittheilungen der Anthropologischen Gesellschaft in Wien*, xix, 1889, p. 11.

⁶ Kruijt, *ibid.*, p. 370; N. Adriani, "Mededeelingen omtrent de Toradja van midden-celebes." *Tijdschrift voor Indische taal-land-en-volkenkunde*, xlv, 1901, p. 228.

⁷ Kruijt, *op. cit.*, p. 370.

⁸ *Ibid.*, p. 378. Van Baarda gives a slightly different version. The land of the dead is situated in the east, but the *dikili*, or the ghosts of those who have died an unnatural death, go to the east part of it, and the *sone-hoa*, or ghosts of those who have died a natural death, go to the west part. *Med. Ned. Zend. Gen.*, i, 1906, p. 201.

⁹ Rosenberg, *Der Malayische Archipel.*, Leipzig, 1878, p. 359; Riedel, *op. cit.*, p. 149.

¹⁰ Riedel, *op. cit.*, p. 182.

will be facing to the land of the dead. The population of Kei-Tanimber, who are mostly Mohammedan, inter their dead in an east-west direction with the head at the east.¹ This mode of orientation may be due to the influence of their religion, but information will be given later which makes this case doubtful.

There is an interesting fact connected with the choice of two islands for the land of the dead. Spread through the Moluccas are two brotherhoods, called *Oerlima* and *Oersiwa* on these islands, and *Patalima* and *Patasiwa* on the Island of Seran. Most writers mention them, but give no information about them. Pleyte, however, mentions that a member of the *Oersiwa* goes to Baer, and a member of the *Oerlima* goes to Ohimas.²

On Tenimber and Timor-Laut the bodies of medicine-men and unimportant persons are interred in a canoe-coffin with the head at the east end.³ Riedel also states that the bodies of chiefs and notables are placed in canoe-coffins⁴ on a platform, the canoe "lying in the same direction."⁵ Von Hoevell simply states that the dead are placed in canoe-coffins on a platform with the head at the west end and the feet at the east.⁶ From the fact that Riedel states that disposal on platforms is the lot of chiefs, that this is, in fact, the more honourable mode of disposal, it would seem that, provided the informants are correct, two categories of persons receive different modes of disposal and different orientations. The evidence, as far as it goes, supports this point of view. Jacobsen says that the bodies of chiefs are placed in canoes on platforms.⁷ Von Hoevell also states that interment is the less honourable mode of disposal,⁸ and van Doren supports him by stating that heads of families and married women who have attained old age are disposed of on platforms.⁹ The land of the dead is on Nusnitu, an island to the west of the group.¹⁰ In the Babar Archipelago the ghosts of the dead are supposed to go to the west. The dead are placed on platforms in canoes, or interred in canoe-coffins. In either case the head must lie at the east end of the canoe.¹¹

In the Leti-Moa-Lakor group the dead are interred in a squatting position. The grave is under the house, and the body is placed sideways in it so that the

¹ J. G. F. Riedel, *De sluik en kroes-haarige rassen tusschen selebes en papua*, p. 240. C. M. Pleyte, "Ethnografische beschrijving der Kei-eilander," *Tijdschrift van het Nederlandsch Aardrijkskundig Genootschap*, Ser. II, deel x, 1893, p. 825. G. W. W. C. Von Hoevell, "De Keieilanden," *Tijdschrift voor Indisch taal-land-en-volkenkunde*, xxxiii, 1889, p. 146.

² Pleyte, *Tijd. Ned. Aardr. Gen.*, Ser. II, deel x, 1893, p. 832.

³ Riedel, *op. cit.*, p. 306.

⁴ Von Hoevell states that they are double canoes. *Tijd taal-land-en-volk*, xxxiii, 1889, p. 169.

⁵ Riedel, *op. cit.*, p. 306.

⁶ *Op. cit.*, p. 169.

⁷ J. A. Jacobsen, *Reise in die Inselwelt der Banda-Meer*, 1896, p. 209.

⁸ *Op. cit.*, p. 169.

⁹ Van Doren, "De Tenimber-eilanden," *Bijdr. Indisch taal-land-en-volkenkunde*, N.S. 7, 1863, p. 85.

¹⁰ Riedel, *op. cit.*, p. 281; Von Hoevell, *op. cit.*, p. 208.

¹¹ Riedel, *op. cit.*, pp. 359, 360.

face is turned towards the east. The land of the dead for Leti is Saaru Metiwanua, a small sandbank south of the island, but for Moa and Lakor it is situated on Wekenau, a small island east of the group.¹

In the Beloe district of Timor the graves are dug in the direction of the land of the dead, and in certain other directions which will be mentioned later.² The dead in Savoe are interred in a sitting position so as to face towards the west.³ The land of the dead is situated in the west, on Sumba.⁴

The Olo Ngadjoe of south-east Borneo practise a peculiar mode of orientation. They place the bodies of the dead parallel to the bed of the river on which they live, with the intention that the ghost shall go up the river to the land of the dead.⁵

Nieuwenhuis⁶ gives a photograph of a Pnihing "cemetery," which is situated at the foot of the Liang Nanja on a shelf under a cliff. The coffins are canoe-shaped, and it is noteworthy that they all face in the same direction. No information is given which would help to show whether the direction of orientation of these coffins had any relation to the direction of the land of the dead, or whether they are placed parallel to the bank of the river on which the Pnihing live. I mention this case in the hope that it may induce observers to notice the disposal of coffins on the banks of rivers, and to investigate whether coffins so disposed are orientated, or merely disposed haphazard. In either case the information is valuable.

The Pangin in the Ella district of the Melawi place their land of the dead on Mount Tebiroeng, which is situated at the source of the Mandei, a tributary on the left bank of the Kapuas. On all ceremonial occasions the directions of rising and setting sun are saluted and invoked. These folk also lie down to sleep with their faces turned to the east, and on cremating the dead they place the body so as to face in the same direction.⁷ Here the land of the dead is in the east, and it would seem that this direction is the one to which most importance is attached. The only disturbing feature is the fact that the "setting sun" is said to be invoked. This may be due to the influence of a solar cult.

The orientation practised by the Olo Dusun, a tribe to the north of the Ngadju, presents a difficulty. Kruijt states that "the body is laid with the head to the east and the feet to the west."⁸ . . . Now the land of the dead is situated on

¹ Riedel, *op. cit.*, p. 394.

² H. J. Gryzen, "Mededeelingen omtrent Beloe o Midden-Timor," *Verhandelinge Bataviaasch Genootschap*, deel 54, p. 65 *et seq.*

³ Riedel, *Revue Coloniale Internationale*, 1885, p. 309.

⁴ W. M. Donselaar, "Aanteekeningen over het eiland Savoe," *Med. Ned. Zend. Gen.*, xvi, 1872, p. 309.

⁵ Kruijt, *Animisme*, p. 370.

⁶ *Quer durch Borneo*, vol. i, p. 376.

⁷ E. L. M. Kuhr, "Schetsen uit Borneo's Wester-afdeeling." *Bijdragen tot de taal-land-en-volkenkunde van Ned-Indie*, 1897, pp. 74, 77.

⁸ *Animisme*, p. 371.

Mount Loemut or Loembut.¹ In the atlas of Stemfoort and ten Siethoff this mountain is placed to the east of the place where the Dusun are at present situated. The direction in which the body lies corresponds with that of the land of the dead, but it would appear that the orientation is towards the west. There are two possibilities, assuming, of course, that the information is correct. The first is that Kruijt has made a slip and transposed the words "east" and "west." Such a mistake is quite easy.² The second possibility is that the case in question is one of orientation to the east, the mode of orientation being analogous to that found among the Ngadjoe. In any case the difficulty is not serious.

The Tenggerese of Bantam place their dead to face towards a certain holy mountain. I do not intend to discuss this case here, for the analysis of many data would be necessary. I hope, however, to show later that the land of the dead would be situated on this mountain.³

It is now clear that the correspondence between the direction of orientation and of the land of the dead is quite definite. I now propose to proceed a step further, and to establish the correspondence between the direction of orientation, or of the land of the dead, and the direction of the home of the forefathers. First of all those cases will be considered in which there is information concerning all three directions, and then those cases where there is only information concerning orientation and the land of the forefathers.

The Badoej of Bantam orient their dead to the south and place their land of the dead in the south. It is stated that the Badoej are Soendaneese who migrated from the south with the last Prince of Padjajaran before the conversion to Islam. In the place where the land of the dead is supposed to be, Dr. Koorders saw a number of graves. It seems therefore more than probable that the bones of this chief are interred there, and that his followers are supposed to return to him after death. In any case these people have migrated from the south, and they think that their dead go back there.⁴ It has been said that the To-Radja, in this case the Posso-Todjo group, place the land of the dead in the west and orient their dead to the west. Tradition assigns the north as the direction whence they have come.⁵ I shall have occasion to refer to this case later in the course of this paper.

In the case of the Galelareeze of Halmahera, the dead are oriented to the west.⁶ The land of the dead is in the west for those who have died a natural death,

¹ *Animisme*, p. 381. Molengraaf, *G.A.F. Borneo Expedition*, English translation, Leiden, 1902, p. 332.

² For example, on p. 370 of his *Animisme*, he states that the dead in the Leti-Moa-Lakor group face to the east, whereas they actually face to the west.

³ Kruijt, *Animisme*, p. 373. Cf., however, J. H. F. Kohlbrugge, "Die Tenggeresen," *Bijdr. taal-land-en-volk*, 6, Ser. IX.

⁴ Kruijt, *Animisme*, pp. 373, 374. L. von Ende, "Die Baduwi auf Java," *Mitt. Anth. Ges.*, Wien, XIX, 1889, p. 9 *et seq.*

⁵ A. Kruijt and N. Adriani, *De Bar'e-sprekende Toradja's van Midden-Celebes*, 's Gravenhage, 1912, vol. i, p. 3.

⁶ I am assuming that the information given by Kruijt refers to the Galelareeze. All the information which he gives as having been obtained by himself in Halmahera refers either to

and in the east for those who have died an unnatural death. Riedel states that there is a tradition among them of migration from the north-west.¹

The Kei-islanders furnish another correspondence. The first inhabitants are supposed to have come from the north, from Seran, Gorong, and Bandang.² Pleyte states that some of the inhabitants are the descendants of settlers from the west.³ This is in part corroborated by Planten, who mentions migrations from Seran, Banda, and Timor; that is to say, partly from the north and partly from the west. The evidence and the weight of authority leave no room to doubt that the northward direction of orientation, land of the dead and home of the forefathers correspond. Riedel is the most reliable authority, and he makes no mention of the eastward movement. There is no reason to doubt that such a movement has taken place, but, on the other hand, the assumption that the westward orientation of the people of Kei-Tanimber is towards a former home in the west is not justifiable because they are Mohammedans. It is, however, plausible as an assumption, because Kei-Tanimber lies to the extreme south-west of the group, and is nearest to the Timor-Laut Islands which are to the south-west, and therefore would be the first place for immigrants from the west to land.

In Tenimber and Timor-Laut there are two directions of orientation, eastward for chiefs and notables, and westward for commoners. The land of the dead is in the east. Some traditions speak of migrations from the north and from the Kei Islands, but the west takes a far more prominent part in the traditions of migration, and there is not much doubt that the westward orientation and the westward direction of the land of the forefathers are in correspondence.⁴ It would, however, be rash to assume in the present state of our knowledge that the eastward orientation corresponds to a migration from Kei. Such indeed may be the case.

In the Babar Archipelago the orientation is westward, and the land of the dead and the land of the forefathers are also in the west.⁵ The direction of orientation, of the land of the dead and of the land of the forefathers, is eastward in the Leti-Moa-Lakor group, for there exists a tradition of migration from the Luang-Sermata and Timor-Laut groups.⁶

The information given by Gryzen concerning Beloe is interesting. The graves are dug in the direction of the land of the dead, and in the direction of those places where the first chiefs procured their wives.⁷ One account of the origin of the

the Galelareeze or the Tobeloreeze, and the same is the case with the information given by Riedel concerning the direction of migration. In any case there is a correspondence between the directions of orientation and of migration. I assumed that the information referred to the Galelareeze, because in their case Kruijt also gives information concerning the direction of the land of the dead.

¹ Riedel, *Zeitschrift für Ethnologie*, xvii, p. 58.

² Riedel, p. 218. H. G. Langen, *Die Key-Inseln*, Wien, 1902, p. 28. H. O. W. Planten *Tijd. Ned. Aardr. Gen.*, Ser. II, ix, 1892, p. 649.

³ *Tijd. Ned. Aardr. Gen.*, Ser. II, deel x, p. 564.

⁴ Riedel, p. 275 *et seq.*

⁵ *Ibid.*, p. 334.

⁶ *Ibid.*, p. 369.

⁷ Gryzen, *Verh. Bat. Gen.*, liv, p. 65 *et seq.*

people of Savoe states that they are descended from Kieka, who was the first inhabitant of Randjoewa, a small island to the west of the group. The land of the forefathers is thus in the same direction as the land of the dead.¹ The Olo Ngadjoe place the land of the dead up the river on the banks of which they live. Kruijt gives some information which makes it quite clear that the land of the dead is situated in the centre of the island, and that it is from thence, the Mambaroeh district between the Upper Kapuas and the Melawi, that these people have come. This is one of those cases which come under the wide definition of orientation.

The body is not actually facing towards the land of the dead, but there is no doubt as to the intention of the survivors.² The Pangin of the Ella district have their land of the dead in the east. They also believe that they have come from that direction.³

The Kom clan of the Kuki of Manipur have a mode of disposal of the dead which also comes in the category of orientation. The dead are interred on the south side of the village, the land of the dead is situated in the south, and it is from the south that they believe themselves to have come. Here then is a definite relationship between the position of the body and the direction of the land of the dead. The aim here, as elsewhere, is to send the ghost back to the land of the forefathers.⁴

These cases all go to establish the correspondence between the three directions. I shall now proceed to adduce a few cases where there is only information concerning the direction of orientation and of the land of the forefathers.

The Hajong division of the Kachari of Assam orient their dead to the south, and it is from the south-east that they claim to have come.⁵ The Khasi place their dead on the funeral pyre so as to face to the east, the body being in an east-west direction with the head at the west end. They come from the east.⁶

In the Malay Peninsula the Mantra place their dead, sometimes standing, sometimes reclining, in a tomb in a lonely spot. If a child, the body is made to face to the east; if an adult, to the west. There is a tradition that these people came from the west, but whether it be due to Mohammedan influence or not, I cannot say at present.⁷

One mode of disposal among the Mentawi islanders is to place the body on a platform so as to face to the east.⁸ There exists among these people a tradition of

¹ M. Teffer, "Naamlijst van al hetgeen den Savoenees tot onderhoud en veraangenaaming des levens wordt geschonken," *Tijd. taal-land-en-volk*, xxiii, 4, 1876, p. 351.

² Kruijt, *Animisme*, p. 345.

³ E. L. M. Kuhr, *op. cit.*, p. 74.

⁴ J. Shakespeare, *The Lushei Clans*, p. 150; Brown, *Account of Munnipore*, p. 136-137.

⁵ *Assam Census Report*, 1881, p. 71; S. Endle, *The Kachari*, p. 87.

⁶ P. R. Gurdon, *The Khasis*, pp. 10, 132.

⁷ Skeat and Blagden, *The Pagan Races of the Malay Peninsula*, vol. ii, p. 1861; Borie "Notice sur les Mantras" *Tijd. Ind. taal-land-en-volk*, x, 1861, p. 416.

⁸ H. A. Mes, *De Mentawai-eilanden*, xxvi, 1880, p. 93.

migration from the neighbouring coast of Sumatra; that is, from the east.¹ In south-west Timor, Salomon Muller states that the dead are interred so as to face to the east. He also states that the inhabitants of this part of this island came from the Moluccas, and this is substantiated by Graamberg.²

It is now clear that a correspondence exists between the directions, and that the orientation of the dead is associated with a definite aim.

A peculiar case of orientation is reported by Beyer among the Ifugao of Northern Luzon. He describes the ceremonies attending the disposal of the body of Bahatan, a notable of the Banauol clan, whose head had been cut off by a member of the Liŋgai clan.³ When the body had been brought in it was placed sitting on the ground leaning against a pile of the house and facing towards the district of the Liŋgai clan.⁴ When placed in its final resting place, a cave dug out of the hill-side, the body was placed in a sitting position facing towards the Liŋgai district.⁵ A similar orientation for another person whose head had been taken is reported by Barton.⁶

This case is one in which special motives have come into play, and it hardly comes into the same category as those which have been under consideration.

It will have been noticed that, in some cases, for example the Mantra and in Tenimber, distinct categories of persons receive distinct directions of orientation. Another example of this which has not been mentioned is that of the Ronte clan of the Kuki of Manipur. Persons who die an ordinary death are interred to the west of the village; women who die during partus, and children who die before reaching the age of one year, are interred to the east of the village, while those who die an accidental death are interred to the south of the village.⁷ Again, in Angkola the direction of orientation depends on the *marga* or exogamous clan to which the deceased belonged. In the case of the *marga siregar* the body is placed with the head to the west, and in the case of the *marga harahap* with the head to the east.⁸

The Galelareeze also have two directions in which the land of the dead lies.

There are two distinct lines of approach to the problem of the explanation of this diversity of orientation. In the first case, it may be claimed that psychological causes are at work to produce the separation of the two or more categories. Much may be said for this point of view. Or, again, it may be claimed that the assignment of different directions of orientation to different categories of persons is a

¹ C. M. Pleyte, "Die Mentawi-Inseln und ihre Bewohner," *Globus*, lxxix, 1901, p. 4.

² S. Muller, *Reizen en onderzoekingen in den indischen archipel.*, Amsterdam, 1857, vol. ii, pp. 259, 231; J. S. G. Graamberg, "Eene maand in de binnenland van Timor," *Verh. Bat. Gen.*, xxxvi, 1872, p. 200; J. G. F. Riedel, "Die Landschaft Dawan oder West-Timor," *Deutsche. Geogr. Blatter*, x, 1887, p. 285.

³ H. O. Beyer, "An Ifugao Ceremony," *Philippine Journal of Science*, vol. vi, No. 5, Sec. D, 1911, p. 231.

⁴ *Ibid.*, p. 233.

⁵ *Ibid.*, p. 239.

⁶ *Ibid.*, p. 248.

⁷ J. Shakespeare, *The Lushei Clans*, pp. 174-5.

⁸ Kruijt, *Animisme*, p. 371.

result of the complexity of cultures, the category comprising those persons who have died a natural death being typical of the immigrant culture which has overlain that typified by the category of infantile or unnatural deaths. My present opinion is that this view is the correct one, and I hope before long to discuss the problem at length. I shall, however, refer to it again in the course of this paper.

I now propose to extend the inquiry to the orientation of houses and images.

The To-Radja of Central Celebes place their houses in an east-west direction with the door at the west end, thus facing towards the land of the dead.¹

The To-Bada, their neighbours, build their village house in a north-south direction so that, as they say, on entering, one faces to the north, the direction whence they have come, and in which direction they place the land of the dead.² The holy place of the house is the north centre-pile (*hoofd-paal*), and there the ghosts come to live in bunches of leaves of the aruru palm.³ The To-Napoe place their land of the dead upon Mount Tineba, which is east of the place where they live.⁴ At Lamba, their holy places are three temples in which feasts are held. The largest and most important of these "*howa*" has a door in the east side, thus facing towards the land of the dead and in the direction whence they have come.⁵

The Minahassers also build their houses with reference to the direction of the land of origin. They claim to have come from the north, they place their land of the dead in the north,⁶ they build their houses in a north-south direction,⁷ and they also make an offering-place in the north-east corner of their garden huts.⁸

In Leti, Moa, and Lakor the houses are built with the "front" to the east. In the south side of the roof there is a hole for the ghosts to come in and out. This case is interesting for it will be remembered that the land of the dead for Leti is to the south, and to the east for the rest of the group. As no information is given whether the house was on Leti or on the other islands, it is not possible to make any assumption regarding the direction of orientation. There is another case of orientation in this group which adds interest to the problem. When a head has been taken in war it is cut off together with the hands and put under the holy nunu-tree of the village on a stone in front of the *riesre makaare* (a priest), who sits on a raised seat facing the east.⁹

Gryzen in his excellent monograph furnishes exact information concerning the orientation of houses in Beloe. He says: "Often houses are built with the *selak*

¹ Kruijt, *Animisme*, p. 256; N. Adriani, "De voorstellingen der Toradja's omtrent het hiernamaals," *Med. Ned. Zend. Gen.*, iii, 1908, pp. 8-9.

² Kruijt, *Het Landschap Bada*, p. 363.

³ *Ibid.*, p. 366.

⁴ Kruijt, *Animisme*, p. 373.

⁵ Kruijt, "De berglandschappen Napoe en Besoa," *Tijd. Ned. Aardr. Gen.*, Ser. II, xxv, 1908, p. 1296 *et seq.*

⁶ Kruijt, *Het Animisme*, p. 373.

⁷ *Ibid.*, p. 370.

⁸ *Ibid.*, p. 402.

⁹ Riedel, *Sluik-en kroeshaarige rassen*, p. 46.

(veranda) in the direction of the land of the dead (in Fialarang for example towards Mount Lekaan), or else in the direction of the places where the first chiefs procured their wives: the directions thus correspond exactly with those of the graves."¹

The Badoej of Bantam furnish another example. The land of the dead is in the south, and the arrangement of the villages would seem to have some reference to this fact. The house of the village chief (*girang-pu-un*) stands at the south end of the village. Next to it, and to the north of it, stands the village house (*baleh*), and north of that again is the house where the women stamp rice in common. The door of the chief's house is at the north end, the arrangement thus being analogous to the arrangement of the To-Bada house.²

The Mushos or Lahu of Burma have a tradition of migration from southwest China, from a region east of that which they occupy at present.³ On the east side of each house is a small cage for the "*nat*"—an ancestral ghost—to live in.³ It is not stated if the houses are themselves built to face in any particular direction, but it would appear very probable from the preceding that they are.

A similar dwelling for ghosts is found in Minahassa. It is reported among the Toubulu,⁴ and among the Toupakewa.⁵ The structure is called Temboan and it is situated on the east side of the house.⁶ It has already been stated that tradition assigns the north as the direction whence the tribes of Minahassa have come. Until there is definite information regarding these two tribes it will not be possible to express an opinion in this case. It is one of those which will have to be left on one side for consideration in the future.

The Nuforeeze of the Geelvink Bay in New Guinea also would seem to build their houses with reference to the land of the dead, which is situated at the bottom of the sea.⁷

In the case of the shore-dwelling divisions of this folk, the houses are built in the sea, perpendicular to the shore, and have a gallery at the front and at the back; the latter, which thus faces towards the land of the dead, being used by the men and youths.⁸ This case is analogous to that of the people of Beloe.

I regret that I have not been able to collect more cases of orientation of houses. Information upon this point is scarce, and those examples which are

¹ *Verh. Bat. Gen.*, liv, p. 46.

² L. von Ende, "Die Baduwi auf Java," *Mitt. Anth. Ges.*, Wien, xix, 1889, p. 9.

³ E. Jamieson, "Description of the habits and customs of the Moshos (black and red)," *Ethn. Survey of India*, Burma, No. 2, 1909, p. 1; Rev. C. B. Antisdell, "The Lahoo narrative of Creation," *Journal of the Burma Research Society*, I, 1 and 2, 1911, p. 33.

⁴ Hickson, *A Naturalist in North Celebes*, 1889, pp. 214-15.

⁵ Schwarz, "Lijst van voorwerpen met bijgevoerde ophelderingen," *Med. Ned. Zend. Gen.*, xxii, 1878, pp. 277-8.

⁶ Hickson, *ibid.*; Schwarz, *ibid.*

⁷ J. L. van Hasselt, *Zeit. fur Ethn.*, viii, 1876, p. 195; A. B. Meyer, "Notizen uber Glauben und Sitten des Mafoor'sche Stammes," *Jahresber. Ver. Erd. Dres.*, xii, 1875, p. 28.

⁸ J. L. van Hasselt, "Eenige aantekeningen aangaande de bewoners van der Noord-west-kust van Nieuw-Guinea," *Tijd. taal-land-en-volk*, xxxi, 1886, p. 580.

quoted are the result of much searching. I may, perhaps, be permitted to allude to a doubtful case of house-orientation. The land of the dead among the Karo-Batak is in the west. There are two directions of house-orientation among them; one east-west and the other north-south. Volz¹ has made it quite clear that culture-mixture has taken place among them, and he gives very good reason to conclude that the culture of which the east-west direction of houses is typical has overlain that typified by the north-south houses.² It is not possible actually to establish the correspondence between the direction of the land of the dead and the east-west house direction, but the evidence certainly seems to point that way. The chief interest of this case lies rather in the fact that here is a case of difference of orientation due to culture-mixture. This fact goes to support the contention that diversity of orientation of the dead may be due to culture-mixture and not necessarily to psychological causes.

Two interesting cases of the orientation of stone images are recorded in Central Celebes. On a hill in Napoe called "*Watoe taoe*" (stone like a man), where formerly a village of that name used to be, is an image of a female. On either side of its head is a hemispherical projection, probably similar, Kruijt says, to the head-dress of the women of the period when the image was made. It faces east, which is the direction of the land of the dead.

The To-Bada also possess two stone images, one male and one female. Both of them face to the north, which is the direction of the land of the forefathers.³

It has already been stated that there is a contradiction in the case of the Posso-Todjo To-Radja between the direction of the land of the dead and the direction of the land of origin. In the case of two other allied groups, the To-Bada and the To-Napoe, the correspondence between the directions is quite definite. The two latter folk belong to the Parigi-Kaili group, and are stated by Kruijt to be more "primitive" in culture than the Posso-Todjo group. Their culture is certainly less complex, as is shown by their religion. "While the Parigi'sch-Kaili'sche group (who have not come into contact with the later imported Islam) only believe in and worship the ghosts of ancestors, and apart from these merely fear tree-spirits, the Posso-Todjo group have a very extensive pantheon of nature gods, which we have in vain sought among the other group."⁴ Among the Posso-Todjo group a distinct sun-cult is found,⁵ and therefore there would seem to be reason to think that the westward orientation found among them is due to this sun-cult. One great interest of this contradiction lies in the fact that the sun-cult is evidently a later element in the culture of the To-Radja. It is not found among the mountain tribes, but among those groups which have come to live in the plains and have added to their religious beliefs and rites.

¹ *Nord Sumatra*, vol. i; *Die Bataklander*, Berlin, 1909, ch. ix *et seq.*

² Volz, *op. cit.*, p. 303.

³ Kruijt, *Het Landschap Bada*, pp. 359-361.

⁴ Kruijt and Adriani, I, p. 8.

⁵ *Ibid.*, p. 269.

I hope to show at some future date that the culture characterized by the sun-cult has come in and overlain the more primitive culture of the Parigi-Kaili group, and that this simpler culture is still to be traced in the culture of the more complex groups. It may even be argued that this case of contradiction is more apparent than real, and that the underlying causes are similar. The examination of this thesis will have to be deferred, but I hope to consider it along with the general problem of the sun-cult in Indonesia.

The facts quoted in this paper make it quite evident that, in the great majority of cases, the direction of orientation is determined by the direction of migration, and that, therefore, the hypothesis of Herbert Spencer is the one which fits the facts most closely. The solar hypothesis is quite inadequate. It does not fit the facts, and, even in itself, it raises more difficulties than it pretends to solve. It leaves entirely out of count the fact that a motive must be supplied for the removal of the land of the dead to a distance. It makes the choice of a future home a matter of blind chance. If we consider those destinations of the dead which Tylor mentions as derived from a solar cult—in the east (I assume that this is a legitimate inference from the eastward orientation), in the west, or underground—no mechanism is forthcoming to account for the fact that in the same tribe the usual rule is that only one direction of orientation is found. The “ancient myth-maker” cannot be anything but an abstraction for the tribe as a whole, so that it is very necessary to account for the uniqueness of orientation which is usually found among a given people. A detailed examination of this hypothesis would be interesting as an exercise in logic, but in view of its inadequacy it is hardly necessary. It does not follow that a solar cult should be neglected as a cause of orientation. The matter should rather be put thus:—That before referring any case of orientation, either of the dead or of a house or an image, to the influence of a solar cult or of natural local conditions, it must first be determined that the case in question is not one of orientation to the land whence the people in question believe themselves to have come.¹

¹ M. Joustra, *Med. Ned. Zend. Gen.*, xlii, 1902, p. 421, refers the north-south and east-west direction of houses among the Karo to the directions of the streams on which the villages are situated. The results of Volz's investigations, however, make it quite clear that house-direction is a cultural element among the Karo. Professor Flinders Petrie was kind enough to refer to this point during the discussion which followed this paper at the 1913 meeting of the British Association at Birmingham. I think rather that this paper has made out a case the other way, and that before referring the orientation of houses to natural conditions it must first be shown that it is not determined by the direction of migration.

	Orientation of Dead.	Orientation of House.	Orientation of Images.	Direction of Land of Dead.	Direction of Land of Forefathers.
KACHARI	S.	—	—	—	S. or E.
KHASI	E.	—	—	—	E.
KUKI-KOM	S.	—	—	S.	S.
RONTE	S.-W.-E.	—	—	—	—
MUSHO or LAHU	—	E.	—	—	E.
KARO	W.	E.-W. ; N.-S.	—	W.	—
ANGKOLA	E.-W.	—	—	—	—
ANDAMAN	E.	—	—	E.	—
MENTAWI	E.	—	—	—	E.
MANTRA	E.-W.	—	—	—	W.
BADOEJ	S.	N.-S.	—	S.	S.
OLO NGADJOE	orient their dead to land of dead and land of forefathers.				
OLO DUSUN	E.-W.	—	—	E.	—
PANGIN	E.	—	—	E.	E.
POSSO-TODJO To-RADJA...	W.	W.	—	W.	N.
TO-NAPOE... ..	—	E.	E.	E.	E.
TO-BADA	—	N.-S.	N.	N.	N.
MINAHASSA	—	N.-S.	—	N.	N.
TOUMBULU	—	E.	—	—	N.
TOUMPAKEWA	—	E.	—	—	N.
NUFOREEZE	men's balcony of house apparently oriented to land of dead.				
GALELAREEZE	W.	—	—	W.-E.	N.-W.
SERANGLAO	N.	—	—	N.	N.
KEI	N.	—	—	N.	N.
TIMOR-LAUT	W.-E.	—	—	W.	W.
BABAR	W.	—	—	W.	W.
LETI, MOA, LAKOR	E.	E.-S. ?	—	E.-S.	E.-S.
BELOE	orient graves and houses to land of dead.				
S.W. TIMOR	E.	—	—	—	E.
SAVOE	W.	—	—	W.	W.
TENGGERESE	orient dead to holy mountain.				

LOIS DE CROISSANCE

AUXQUELLES M'ONT CONDUIT MES RECHERCHES SUR LA CROISSANCE DES DIVERSES PARTIES DU CORPS (1893-1913).

Par le DR. PAUL GODIN, Professeur à l'Ecole des Sciences de l'Education (Institut J.-J. Rousseau) de Genève, lauréat de l'Institut, de l'Académie de Médecine (1902, 1903, 1912) et de la Société d'Anthropologie de Paris.

DES conditions exceptionnellement favorables m'ont permis, au cours de vingt années de recherches sur la croissance des diverses parties du corps, de récolter une riche moisson de faits.¹

La mise en œuvre m'a fourni déjà les éléments d'un certain nombre de formules ayant le caractère de généralité d'autant de lois, enseignées cet hiver à mes élèves de l'Ecole des Sciences de l'Education de Genève, 1912-1913.

Il me semble opportun de les exposer groupées dès maintenant pour que les personnes des divers pays, qui témoignent à mes études un si bienveillant intérêt, soient à même d'évaluer synthétiquement le terrain conquis dans le domaine de la croissance des diverses parties du corps, d'entrevoir les multiples applications médicales et éducatives des résultats obtenus, et de juger de la valeur de la méthode, de la technique, du programme suivis, lesquels procèdent de l'enseignement du Professeur L. Manouvrier.

I

LOIS RELATIVES AUX ALTERNANCES DES ACCROISSEMENTS.

1. L'os grossit et allonge alternativement et non simultanément. Les repos de l'allongement sont utilisés par le grossissement. (1 et 3², Fig. IV.)

2. Les périodes d'activité et de repos qui se succèdent semestriellement dans l'accroissement en longueur d'un os long, sont contrariées pour les deux os longs consécutifs d'un même membre. (1 et 3.)

3. Le semestre représente la durée moyenne de l'alternance d'un grand nombre d'accroissements (ainsi un os long grossit pendant six mois davantage qu'il n'allonge ; puis il allonge pendant les six mois suivants davantage qu'il ne grossit).

¹ Dans les écoles d'enfants de troupe de l'armée où je suis resté médecin et professeur de 1891 à 1900, et chez les enfants à qui j'étais appelé par la famille ou par mes confrères à donner mes soins depuis mon externat à l'Hôpital des Enfants malades de Paris, 1878-80.

² These references are to the list of publications at the end of the paper.—Ep.

La puberté est l'axe autour duquel gravitent les grandes alternances. (3, Figs. I, II, et III.)

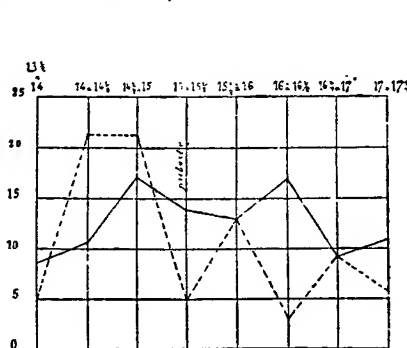


FIG. I.

Buste, — membre inférieur, ----

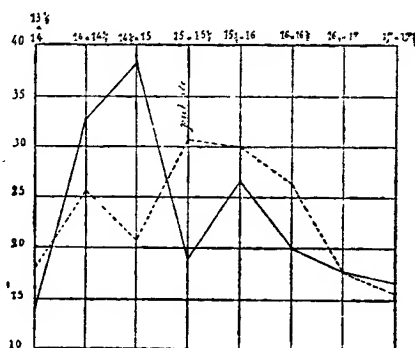


FIG. II.

Taille, — poids, ----

4. La taille doit la plus grande part de son développement avant la puberté au membre inférieur, après la puberté au buste. (1 et 3, Fig. I.)

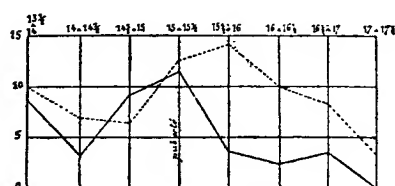


FIG. III. — Cuisse, allongement —
grossissement musculaire ----
(Circonférence maxima).

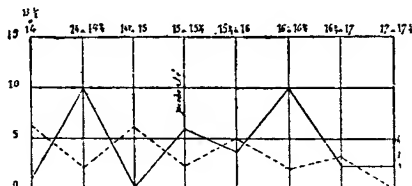


FIG. IV. — Jambe, allongement —
grossissement osseux ----
(Circonférence minima).

5. Les principaux accroissements péripubertaires de la taille se produisent pendant les deux semestres qui précèdent l'éclosion de la puberté. Les principaux accroissements péripubertaires du poids ont lieu pendant le semestre même de l'éclosion de la puberté, et pendant les deux semestres qui la suivent. (1 et 3, Fig. II.)

6. La croissance est surtout osseuse avant la puberté, et surtout musculaire après elle. (1 et 3, Fig. III.)

II.

LOIS RELATIVES À LA PUBERTÉ.

1. La puberté est la clé de la croissance.
2. Le début de la pousse des poils pubéus, P^1 , précède de trois semestres en moyenne l'éclosion de la puberté, $P^3 A^1$. (12.)
3. Dans le sexe masculin, le début de la pousse des poils axillaires répond à l'éclosion pubertaire. (1 et 12.) Dans le sexe féminin (Dr. Marthe Francillon), le début de la pousse des poils axillaires aurait un léger retard sur la première menstruation.

4. P⁵ A⁵, qui marquent la fin de la phase pubertaire, surviennent quatre semestres environ après P³ A¹. (1, 2, et 12.)

5. Douze à dix-sept ans séparent la puberté de la naissance. C'est la période pré-pubertaire de la croissance. Deux années suffisent pour son installation, et constituent la période pubertaire. Au-delà, trois années sont nécessaires pour atteindre la nubilité, trois années qui représentent la durée de la période post-pubertaire de la croissance, ou période internubilo-pubertaire. (11 et 12.)

6. La puberté est précoce ou tardive selon la valeur de "l'alimentation placentaire." (9 et 11.)

7. La puberté est la *période de maturation des organes de reproduction*; elle répond à la maturité de l'encéphale, mais marque seulement le début de la dernière étape du soma vers sa maturité.

8. La puberté détermine normalement des inégalités de l'accroissement, qui ont pour objet l'appropriation définitive du soma à la fonction de reproduction, mais qui entraînent souvent des troubles temporaires non-pathologiques: tels sont la "mue de la voix," les "vergetures de croissance," et un grand nombre d'autres troubles qui déterminent chez l'écolier des gênes diverses à répercussion psychiques. (9, 10 et 12.)

9. La durée des effets de l'accroissement inégal pubertaire dépend de celle de l'alternance des accroissements auxquels ils se rattachent. Si elle se prolonge, c'est que l'action d'une cause éventuelle la soustrait à la loi des alternances, et, dans ce cas, les troubles prennent un caractère pathologique. (9, 10 et 12.)

10. La puberté a sur le pigment une action inverse suivant qu'il s'agit du pigment de la peau et des cheveux qu'elle fonce, ou bien du pigment de l'iris qu'elle éclaircit. (1 et 12.)

III.

LOIS RELATIVES AUX PROPORTIONS.

1. De l'enfant naissant à l'homme, chaque segment a sa manière propre de se comporter vis-à-vis de la taille. (4, Fig. V.)

2. Si l'accroissement proportionnel est supérieur à celui de la stature pour un segment du corps, il lui est inférieur pour le segment situé immédiatement au-dessous ou au-dessus. (4, 8, 12.)

3. Tel segment qui progresse relativement plus que la stature jusqu'à la puberté, retarde sur elle au-delà de l'âge pubère et réciproquement. (4 et 8, Figs. V, VI et VII.)

4. Les proportions de largeur, en général, présentent des variations propres qui sont en corrélation avec celles des proportions de longueur du tronc. (7 et 8, Fig. VI.)

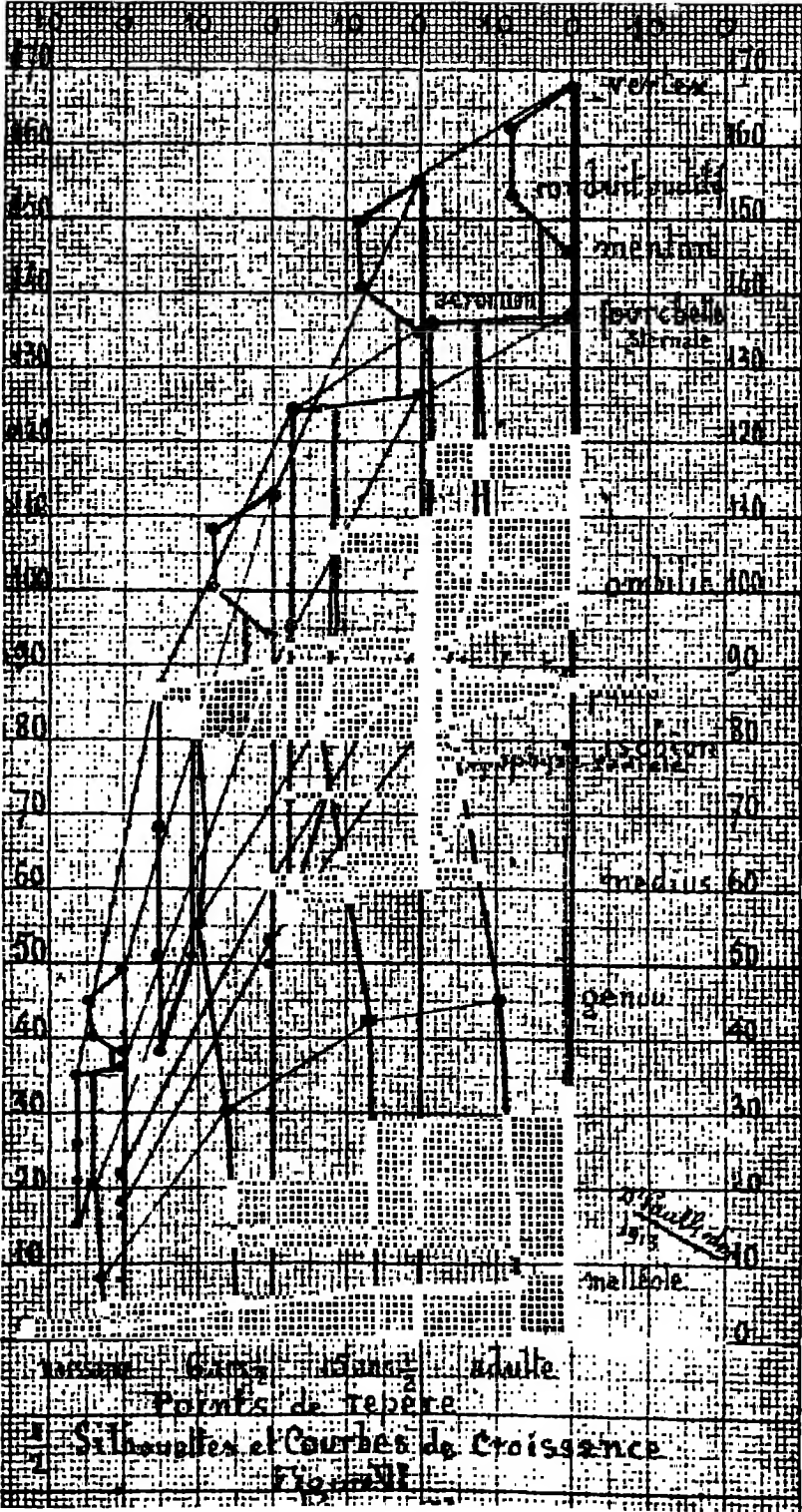


FIG. V.

5. Il existe trois phases dans l'évolution des variations présentées par les proportions de longueur et de largeur au cours de l'ontogénie post-foetale : la première phase s'étend de la naissance à 6 ans, le deuxième de 6 à 15 ans, et la troisième de 15 ans à l'âge adulte.

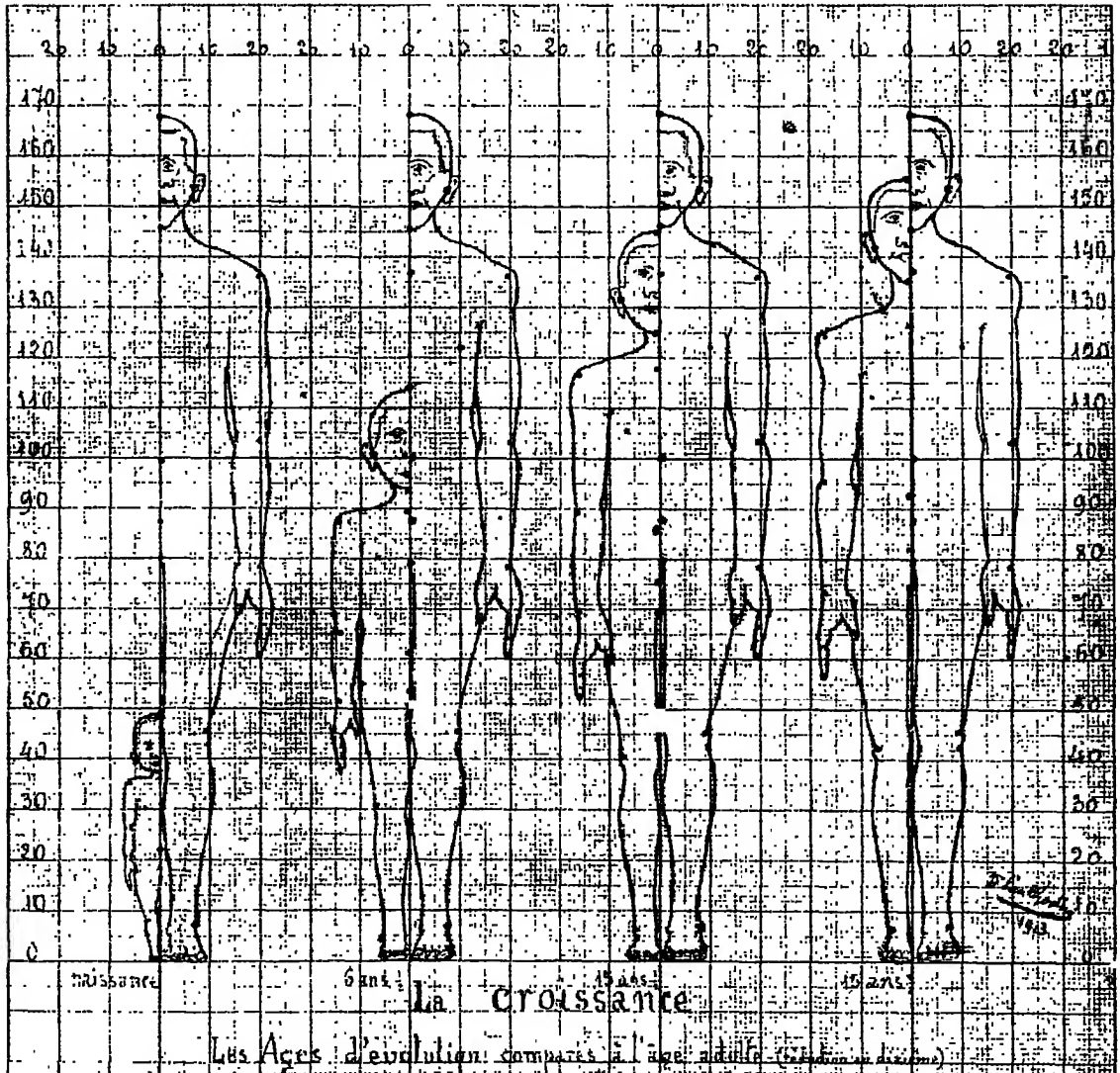


FIG. VI.

6. Des proportions déterminées pour chaque catégorie¹ de constitution organique répondent à la période pubertaire et le plus souvent à l'éclosion même de la puberté. (11 et 12.)

¹ "Le Médecin, l'enfant et la famille." In-8°, 200 pp., Paris—Maloine édit., 1913.

Proportions du Corps
représentées en millièmes de la taille pendant la
Croissance

13½ 23½

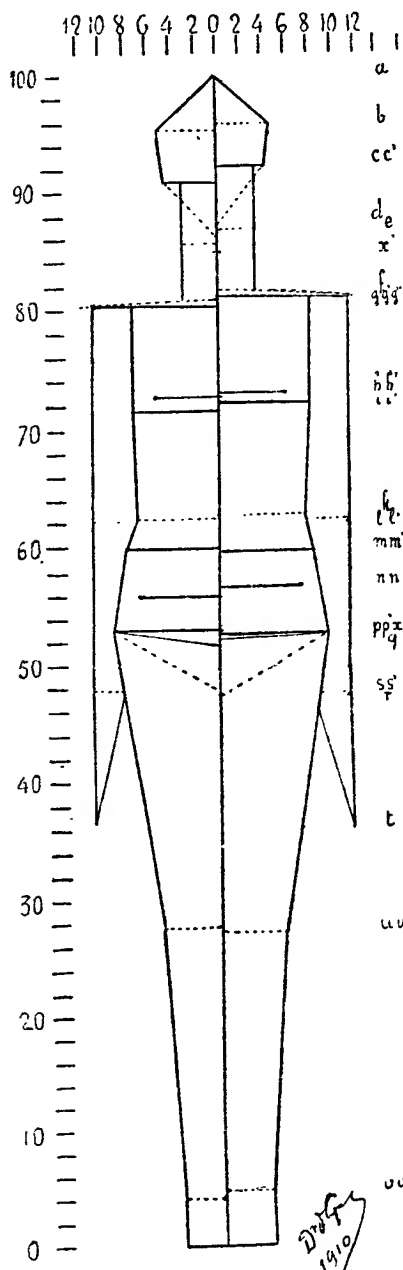


FIG. VII.

7. Les proportions permettent, en conséquence, de connaître, d'une manière approchée, le laps de temps qui, à un moment donné, sépare un enfant de sa puberté, c'est-à-dire, son âge pubertaire, son âge d'évolution. (11 et 12.)

8. A 6 ans, en moyenne, neuf années environ avant la puberté, les proportions sont telles pendant un semestre ou deux que la silhouette de l'enfant indique celle de l'adulte futur. (4 et 8, Figs. V et VII.)

IV.

LOIS RELATIVES AUX ASYMÉTRIES.

1. Il règne entre les organes binaires une asymétrie corrélatrice de l'hyperfonction : chez le droitier, le membre supérieur droit est plus long et plus gros, l'épaule droite plus basse, etc. . . ., caractères qui passent à gauche chez le gaucher. (5.)

2. L'évolution des asymétries normales des organes binaires et du tronc progresse à travers l'âge en sens inverse de la croissance, mais dans le sens même de la fonction. (5.)

3. Chez le droitier, la supériorité de longueur et de grosseur qui est à droite pour le membre supérieur, siège souvent à gauche pour le membre inférieur, ce qui dénonce une suractivité fonctionnelle croisée. Chez le gaucher, le croisement est inverse. (5.)

4. Les pavillons des oreilles offrent une notable et constante asymétrie, sans corrélation fonctionnelle apparente, et que la croissance tend à effacer. (5 et 6.)

PUBLICATIONS¹

où sont analysés les faits qui ont conduit aux lois.

(1) "Recherches anthropométriques sur la croissance des diverses parties du corps"; Préface du Profr. L. Manouvrier. Ouvrage honoré d'une souscription du Ministère de l'Instruction Publique et *couronné* par la Société d'Anthropologie de Paris (Prix Broca 1902) et par l'Académie de Médecine (Prix Larrey 1903), 224 pp. Paris—Maloine édit., 1902-1903.

(2) "De la puberté à la nubilité," Société d'Anthropologie, 9 juillet, 1909.

(3) "Alternances des accroissements (semestriels) au cours du développement du corps humain (dans le sexe masculin)," Société de Biologie, séance du 25 juin, 1910. Etude couronnée par l'Académie de Médecine (1912).

(4) "Les proportions du corps pendant la croissance," Société d'Anthropologie de Paris, 1910. Ouvrage couronné par l'Académie de Médecine (1912).

(5) "Asymétries normales des organes binaires chez l'homme," Académie des Sciences, 1900 et 1910.

(6) "A propos de l'asymétrie auriculaire," Société d'Anthropologie de Paris, 1910.

(7) "Variations des proportions de longueur et de largeur du corps dans le sexe masculin au cours de l'ontogénie post-fœtale," Académie des Sciences, 1911. Etude couronnée par l'Académie de Médecine (Prix Larrey, 1912).

(8) "Variations des proportions—leurs lois évolutives," Académie de Médecine, 1911.

(9) "Essai d'explication du rôle de la puberté chez l'homme," Société d'Anthropologie, 1911.

(10) "L'accroissement inégal à l'époque de la puberté," Académie des Sciences, 1912.

(11) "De quelques rapports de l'évolution de croissance avec la puberté" (XIV^e Congrès d'Anthropologie, Genève, 1912).

(12) "La croissance pendant l'âge scolaire." Applications éducatives. Leçons faites à l'Ecole des Sciences de l'Education (Institut J. J. Rousseau) de Genève, pendant le semestre d'hiver 1912-1913. (Collection d'Actualités pédagogiques, Neuchâtel, Delachaux et Niestlé édit., 1913.)

¹ Ces divers travaux s'appuient sur deux mille observations à la fois anatomiques (300,000 mensurations), physiologiques, psychologiques et cliniques.

THE PREHISTORIC POTTERY OF THE CANARY ISLANDS AND ITS MAKERS.

By the HONOURABLE JOHN ABERCROMBY, LL.D., F.S.A.Scot.

[WITH PLATES XXVI-XXXV.]

DURING a month's visit to the Canary Islands in parts of January and February, 1914, I had photographs made for me by Mr. Chas. Medrington, an English photographer at Las Palmas, Grand Canary, of a large number of the pieces of Canarian pottery preserved in the museum there. At a later date he sent me photographs of what is to be found in the museums of Santa Cruz de Tenerife and of Santa Cruz de la Palma. I made brief notes of the material in these three museums, but unfortunately the remarks on the collections in Tenerife and La Palma were left behind in Paris, which I had to leave very hurriedly without my heavy baggage on August 2nd. Still, I hope that the photographs of 133 examples of Canarian pottery, and such notes as I have, may be of interest to archaeologists, and that the remarks and discussion which follow may help to fix approximately the period at which the first colonization of the islands took place, and inferentially to show the probability that the original colonists were already in possession of the art of making pottery.

Canarian pottery has been described in general terms, accompanied with four illustrations, by Dr. Verneau in his *Cinq années de séjour aux Îles Canaries*, 1891, a work to which I shall make frequent reference. Sabin Berthelot about ten years earlier had reproduced nine or ten specimens of which only one or two are important.¹

Although the Archipelago embraces seven inhabited islands, whole specimens of pottery are only exhibited, in the above three museums, from five islands: Fuerteventura, the Grand Canary, Tenerife, Goméra and La Palma. I have seen no examples from Ferro, and only fragments from Lanzarote.

When Jean de Béthencourt first came to conquer the islands in 1402 the natives had no sailing craft or boats of any kind, and therefore no intercommunication between the islands, with the exception perhaps of Fuerteventura and Lanzarote, was feasible. By taking advantage of the I. de Lobos, which lies between these two islands, a good swimmer would have no more than about eight miles to traverse from this islet to Lanzarote, a distance well within the powers of the athletic natives to compass. This isolation of the original inhabitants is borne out by their pottery, which is distinctly characteristic in each island.

¹ *Antiquités canariennes*, par Sabin Berthelot, 1879.

The specimens of pottery here presented were found in caves, or in habitations, under circumstances which are unknown to me. But I believe all those from burial caverns were taken from or near the surface, and that excavations of any depth in these places of sepulture have never been undertaken. Dr. Verneau certainly implies that he sometimes used a pick in his examination of sepulchral caves, but he gives no details, and does not leave the impression that he cleared out all the *débris* of any cavern completely.¹ So that although the Canarian pottery has a Neolithic aspect, no single piece is likely to be of very great antiquity.

It will be convenient to take the islands in geographical order from east to west, beginning with Fuerteventura, the nearest point of which lies about fifty-two miles from Cape Juby on the coast of Morocco.

FUERTEVENTURA.

Owing to the mishap recorded above, I have only notes on the external appearance of Nos. 1-4 inclusive, and of Nos. 10, 13, 15, 17. It may be observed here that the surface of the pottery in all the islands, though quite smooth and even glossy to the eye, is always uneven to the touch, as the surface has never been equalized by use of the wheel. The forms of this pottery are simple enough, for with small modifications of profile all might be derived from a small conical vessel, or from a semi-circular bowl.

No. 1, height 19.1 cm., surface rough, paste stony, has a conical body and a short neck 6 cm. high. On one side are nine incised vertical lines.

No. 2, height 15.3 cm., paste coarse, smooth surface, yellow-brown below, blackened above, conical body now injured has a short neck. Ornamented with a belt of incised vertical lines.

No. 3, height 23.5 cm., walls 7 mm. thick at the rim, surface rough, yellow-grey in colour, conical body and short neck. Ornamented with a belt of incised lines.

No. 4, height 28 cm., surface rough, hardly smoothed, in colour yellow-grey, conical body, with short neck. Ornamented with a row of incised vertical lines in groups and at intervals.

No. 5, height 33 cm., same type as the last, ornamented with a band of incised vertical lines.

No. 6, height 20.3 cm., body conical, with high neck. At its base several incised horizontal lines.

No. 7, height 28 cm., in form truncated biconical. Round the upper part runs a chequer pattern of incised lines, alternately horizontal and vertical.

No. 8, height 26.6 cm. Subglobular, plain.

No. 9, height 15.3 cm., nearly globular. Incised ornament.

¹ R. Verneau, *Cinq années de séjour aux Îles Canaries* (1891), p. 188.

No. 9. bis. Ovoid with short neck. Ornamented with incised lines, horizontal and vertical, and with three pairs of nipple-like projections at the greatest diameter. This vessel is from Dr. Verneau's collection in the Trocadero Museum in Paris.

No. 10, height 21·6 cm. Flattened globular, thinnish walls, smooth, yellow-grey. The incised vertical lines are deep, and do not run entirely round the vessel.

No. 11, height 7·6 cm. Subglobular body with high neck.

No. 12, height 21·6 cm. Subglobular with low neck and flat bottom. Ornamented with a row of incised chevrons at base of neck, and lower down a band of rectangular meander.

No. 13, height 13·3 cm., paste fine, walls thin, colour pale brown, globular with square-sided spout. A line of incised chevrons round the rim, and a triple-line panel design, the upper part in festoons, occupies the body.

No. 14, height 15·9 cm., of the same type as the last, and with similar ornament. It is now in the museum at Tenerife, and attributed to that island, but it resembles so closely *No. 13*, from Jandia, that I have no hesitation in ascribing it to Fuerteventura. The museum numbers of *Nos. 12, 14,* are consecutive, viz., 507, 508, a circumstance which may corroborate this view.

No. 15, height 19·1 cm., paste fine, 2 mm. thick at the rim, but thickening below, surface smooth, warm yellow in colour, provided with a large square spout. Ornamented with deepish grooves, 2 mm. wide.

No. 16, height 9·6 cm., a rudely-made cup with a nearly conical base. Ornamented with short incised lines.

No. 17, height 36·9 cm. A large flagon in bad condition, thick walls, surface smooth, blackish in colour, has a stout handle.

Nos. 3, 13 are from Jandia at the south-west end of the island. *No. 9* is from Oliva in the northern part of the island. *No. 9 bis* is from near Pájara on the west side of the central part. *No. 4* is from La Guancha, a place not given on the map, but there are places of that name in the Grand Canary, in Tenerife and Goméra.

THE GRAND CANARY.

The distance from Jandia Point, Fuerteventura, to Las Palmas in the Grand Canary is about 57 miles.

The types of pottery in this island are more varied than in the others; most vessels are provided with handles, some with spouts, others with lids, and some of the ware is red-faced and ornamented with painted designs. Cedeño, one of the earliest Spanish writers (*c.* 1480) on the natives of the Grand Canary, mentions a few facts in this connection. The pottery, hand-made and manufactured by women, was of more than one quality. Pots to put on the fire, large and small cups and dishes, for domestic use, were all very coarse and ill turned out. But a finer ware was painted with red ochre. When dry the vessel was burnished with a smooth

stone which gave it an excellent and durable lustre. Finally the ware was buried in a hole over which a fire was made and kept burning till the vessels were sufficiently baked.¹

I begin by showing some of the simplest forms, and arrange the others by the type of handle; loop-shaped in two varieties, straight handles, flat dishes with handles and slab handles perforated with a circular hole, numbering in all seventy-six pieces. This number does not include the whole collection of the pottery of the Grand Canary in the museum at Las Palmas, but a large proportion of it. A few specimens of forms not here represented were too large and heavy to take down with safety from the high shelves on which they rested; others are mostly duplicates of types here exhibited.

Simple Forms.

No. 18, height 11·5 cm., bowl-shaped, paste and surface reddish, bottom flattened, but not level.

No. 19, height 14 cm., bowl-shaped, paste is yellow-grey, walls thinnish, in colour yellow-grey, blackened in places. A neck is just beginning to show.

No. 20, height 5·7 cm., ovoid cup of walnut colour, with four holes of suspension, surface smooth.

No. 21, height 6·7 cm., a lop-sided cup, yellowish, with very uneven surface and of careless make.

No. 22, height 7·6 cm., oval, flat-bottomed pan, with smoothed, thick walls of uniform red.

Loop Handles.

No. 23, height 6·7 cm., a chocolate-brown cup with a smooth, glossy, but uneven surface.

No. 24, height 8·3 cm., walls thin, black on one side, yellowish elsewhere, a red band round the rim and handle, bottom slightly convex, tooled all over with slight vertical grooves.

No. 25, height 10·3 cm., coarse ware, yellowish and black in most parts, roughish, but with a certain polish, periphery of bottom ill-defined.

No. 26, height 6·3 cm., heavy, solid make, yellowish with black stains, surface tooled.

No. 27, height 9·5 cm., plain.

No. 28, height 8·4 cm., of coarse make, unsymmetrical, yellow-grey with reddish and brown stains, handle heavy.

Some small cups like No. 28 in the Las Palmas Museum are very rudely made and unsymmetrical, others are better formed and are regular enough.

¹ Dr. Chil y Naranjo, *Estudios . . . de las Islas Canarias*, i, p. 503.

Some of the rudest vessels have a height of about 2·5 cm., and have no handles. These, and the small cups, are never painted, and their bottom is flat, or nearly so.

Nos. 29, 30, height 11·6 and 20·3 cm., are both reddish, mottled with black and grey, surface smooth; the bottom of the larger vessel is flattish.

No. 31, height 21·7 cm., round-bottomed pot of coarse ware, in colour black.

No. 32, height 9 cm., reddish yellow, pitted all over, including the bottom. Probably had a lid.

No. 33, height 11·5 cm., oval in shape, thickish walls, smooth and polished, of dark red colour.

No. 34, height 9·5 cm., without the lid, paste pale grey, externally reddish-yellow with many black stains, bottom rounded, a small round hole pierced between each ear and rim.

No. 35, height 12·4 cm., including the lid, yellow-brown, with black stains, lid and bottom flat.

No. 36, height 13·3 cm., biconical, with well-developed neck, solid make, with thickish walls, reddish-yellow, outer surface of ears slightly grooved.

No. 37, height 23 cm., heavy, coarse ware, with smoothed but very uneven surface. Periphery of bottom ill-defined.

Thick handles, perforated with a round hole, pointed at the upper end, upper surface flat, under side rounded. They are placed at the greatest swell of the vessel.

No. 38, height 9 cm., heavy, well-made bowl, covered with reddish wash, smooth, bottom flat, with ill-defined periphery.

No. 39, height 11·5 cm., heavy, solid ware, walls thick, reddish-yellow, but black underneath, flattish bottom.

No. 40, height 19·1 cm., lip 3 mm. thick, thicker lower down, surface rough and black, spout not perforated throughout.

No. 41, height 17·8 cm., thick walls, smooth, grey-yellow, short neck.

No. 42, height 19·1 cm., discoloured, short neck.

No. 43, height 14·6 cm., thick walls, red but nearly black all over, bottom well rounded.

No. 44, height 14·7 cm., smooth, blackish, has one upright handle and three loop-handles, horizontal at the top, and triangular in profile, neck everted.

No. 45, height 12·7 cm., heavy, well made, rather smooth surface, blackish, outer side of ears slightly grooved.

No. 46, height 17·2 cm., light in weight, well made, smooth, black, outer side of ears slightly grooved.

No. 47, height 22·8 cm. including lid, reddish-grey, blackened in places, ears very thick.

No. 48, height 22·8 cm. without the lid, very heavy smooth, uniform red in colour, well made.

No. 49, height 21 cm., walls of neck thin, smooth, yellowish, ornamented with red vertical zigzags rudely drawn, one ear broken off, and the point of the other.

No. 50, height 30·5 cm., lip 5 mm. thick, smooth surface, red with yellow patches, four stout ears.

Solid handles, upright or sloping, nearly always perforated at the base, and sometimes perforated as spouts.

No. 51, height 17·5 cm., dark brown, roughish, spout handle, round bottom.

No. 52, height 14·5 cm., red with black splashes, very heavy, neck walls thick, two upright handles pierced with a hole, bottom flattish.

No. 53, height 11 cm. I omitted to make a note of this vessel.

No. 54, height 11 cm., pale yellow-brown, smooth, much repaired, one solid handle unperforated.

No. 55, height 13·3 cm., biconical, brownish with dark brown painted design, polished and glazed appearance, spout perforated and hole below on a level with opposite loop-handle.

No. 56, height 13·3 cm., biconical, uniform red with black stains, tooled all over as on No. 24, spout perforated at its base; on opposite side is a loop-handle.

No. 57, height 19·7 cm., neck walls thin, red, smooth exterior, two spouts with loops at the base.

No. 58, height 26 cm., globular with flattish base and everted neck, spout not perforated, pierced at base; opposite is a loop-handle, smooth but uneven surface, reddish-yellow.

No. 59, height 28·5 cm., globular with flattish base and everted neck, walls thinnish, smooth but uneven surface, reddish-brown, three heavily-made handles and spout perforated at the base. On a line with the base is a triangular projection which in other examples is perforated horizontally.

No. 60, height 29·7 cm., smooth, red with four broad, vertical, black stripes from below neck to the bottom. Spouts, not perforated, serve as handles.

Flat dishes with handles and one ornamented plate.

No. 61, height 4·2 cm., 5 mm. thick at rim, dull red, smooth but not polished, bottom convex, two perforated ears.

No. 62, height 4·7 cm., heavy, red, smoothed but uneven, two perforated ears or loop-handles.

No. 63, height 6·3 cm., thick heavy solid ware, yellowish with broad diagonal red stripes, bottom ornamented with horizontal rows of large red triangles touching at the base, square-sided short spout perforated below, on opposite side a perforated handle.

No. 64, height 5·1 cm., diam. 24·1 cm., thick walls, red inside and round the sides, bottom brown and black, two slanting solid handles.

No. 65, height 5.1 cm., diam. 29.7 cm., fine paste, surface yellowish mottled with black, uneven, has a spout and solid handle.

No. 66, height 2.2 cm., glossy red inside with black concentric circles, outer circle composed of black, standing triangles. The bottom is glossy red with black strips as shown on the photograph.

Rectangular slab-handles pierced with a round or square hole near its base.

There is an interesting development from Nos. 67–74 showing how a slab-handle, at first standing free, may gradually curve round till it unites with the neck just below the rim.

No. 67, height 13.3 cm., rude coarse ware, unsymmetrical, surface smooth, yellow-grey with brown stains, round bottom.

No. 68, height 13 cm., surface smooth, uniform red, the handle thins out at upper end, bottom flat.

No. 69, height 12.7 cm., well made in every respect, surface smooth, uniform glossy red, with large round spots, fully 5 cm. in diameter, of paler colour. Handle thins out at upper end, bottom flat.

No. 70, height 14.6 cm., smooth, red with yellowish patches. Handle slightly curved with arch-like opening at the base, bottom flat.

No. 71, height 19 cm., coarse ware, surface rough, brown, arch-like opening at base of handle, sides of the arch prolonged by a raised moulding.

No. 72, height 24.8 cm., thickish walls, yellowish inside and outside. Arch-like opening at base of handle, its outer surface curved and connected with base by a moulding.

No. 73, height 24.1 cm., heavy ware, smoothed, yellow-brown. Arch-like opening at base of handle, which curves round and unites with the rim of the jug.

No. 74, height 20.3 cm., very heavy, walls thick, blackish and reddish. Of same type as the last.

No. 75, height 10.1 cm., truncated cone, walls thickish, smoothed, uniform red within and without, slab-handle.

No. 76, height 7.8 cm., glossy red with oblique bars of black 1.9 cm. wide, blackened in places and on the inside, convex bottom.

No. 77, height 8.9 cm., surface smooth, burnished red, thickness at rim 4 mm.

No. 78, height 10.8 cm., at rim 5 mm. thick, yellowish, tooled all over as on Nos. 24, 56, bottom convex.

No. 79, height 12.1 cm., surface smooth, brown with ornament in red.

No. 80, height 12.1 cm., paste fine; surface burnished, reddish-yellow with pattern of large chevrons in red, walls 5 mm. thick.

No. 81, height 15.2 cm., quite exceptionally for the type there is a loop-handle. I have no note on this vessel.

No. 82, height 16.8 cm., surface reddish with vertical chevrons in red, bottom convex.

No. 83, height 14.6 cm., walls 3 mm. thick at lip and 7 mm. near the bottom, surface yellowish, ornamented with rows of triangles in red. Bottom convex with depth of 22 mm.

No. 84, height 11.5 cm., paste fine, surface burnished, yellowish-red with ornament in red. Bottom convex.

No. 85, height 12.7 cm., paste fine and yellowish-red, surface much worn, of pale red with painted pattern in brighter red. Bottom convex.

No. 86, height 12.7 cm., walls 3 mm. thick at rim, surface red, burnished, ornament in brighter red. Bottom convex.

No. 87, height 6.5 cm., surface burnished, smooth, bright red with black stains. Bottom convex.

No. 88, height 11.5 cm., paste of iron grey, surface rough. Bottom convex.

No. 89, height 6 cm., red inside, bottom and sides ornamented.

No. 90, height 6.4 cm., surface smooth, red, ornamented with black triangles. On the bottom is a 5-star figure in black.

No. 91, height 5.1 cm., biconical, surface smooth, polished, bright red inside. Outside is blackish with a broad chevron in bright red. On the bottom are three concentric circles in bright red.

No. 92, height 8.2 cm., surface smooth, bright red, upper part ornamented with hanging triangles in black, bottom ornamented with black triangles, the apex turned outwards. The long sides of handle taper towards the extremity.

No. 93, height 6.1 cm., diameter 22.3 cm., walls thickish, fairly smooth dull red.

TENERIFE.

The distance of the nearest point on the Grand Canary to Santa Cruz de Tenerife is about 42 miles. The 22 examples here given from Tenerife are nearly all plain bowls with round or conical bottoms. A type provided with a handle (Nos. 106-111 inclusive) is so common that I omit to illustrate more than these. No. 109 in the Museum of Santa Cruz de Tenerife is labelled as from Fuerteventura, but it bears no number, and it can hardly be doubted that its origin is from Tenerife itself. On the other hand No. 101 is given with reserve. It has no number, and though attributed to Tenerife it has such a resemblance to Nos. 13, 14, from Fuerteventura, that it seems quite possible a mistake has been made with regard to its origin. No. 98 is of wood with a broad handle, which may remind us of the slab-handles of the Grand Canary. When it exists the ornamentation is of the simplest, and is confined to a few incised lines.

No. 94, height 8.9 cm., heavy ware, surface roughish, brownish, walls 6-7 mm. thick, unsymmetrical.

No. 95, height 9.5 cm., ornamented with incised lines.

No. 96, height 8.3 cm., rim milled, ornamented with incised diagonal lines and a small boss.

No. 97, height 11·3 cm., a bowl with two short horizontal handles.

No. 98, height 9·3 cm., a wooden bowl, coarsely made with thick walls and a broad handle.

No. 99, height 2·9 cm., small cup with handle, ornamented with a chequer pattern below the rim.

No. 100, height 4·8 cm., small cup with spout.

No. 101, height 11·3 cm., bowl with spout, a band of incised chevrons below the rim.

No. 102, height 23·8 cm., paste stony, walls 3 mm. thick at lip, thickening lower down, surface uneven, brownish.

No. 103, height 11·2 cm., conical bowl, plain.

No. 104, height 11·5 cm., conical, plain.

No. 105, height 12·7 cm., conical, surface reddish and unpolished.

No. 106, height 14 cm., conical with handle, rude make, reddish stained with black.

No. 107, height 18·5 cm., conical with handle.

No. 108, height 12·5 cm., conical with handle, nearly black.

No. 109, height 12·7 cm., conical with solid handle.

No. 110, height 13·3 cm., surface uneven, brownish, spout 5 cm. in diameter, walls 2 mm. thick at the lip.

No. 111, height 19·1 cm., blunted conical with handle broken off.

No. 112, height 25·4 cm., conical with a neck.

No. 113, height 14 cm., cylindrical with flat bottom ; ornamented with incised vertical lines.

No. 114, height 22·8 cm., conical with blunted base, upper part of the walls converge inwards ; ornamented with incised lines.

No. 115, height 30·5 cm., globular with slight neck and flat bottom ; ornamented with incised lines.

GOMÉRA.

The distance from Tenerife to Goméra is about 20 miles.

In the three native museums above mentioned there are only two examples of Goméran pottery and one wooden vessel, unpolished and of grey colour, shaped like a saucepan, though the sides are not straight but present in profile a double curve.

No. 116, height 11·2 cm., bowl-shaped and unsymmetrical.

No. 117, height 8 cm., bowl-shaped, surface rough, dark reddish with black stains.

LA PALMA.

The distance between Goméra and La Palma is about 35 miles.

Of the 17 examples here figured all save two are varieties of bowls, rounded or

slightly conical at the base. Their ornamentation, however, is sometimes more complex, and different from that in the other islands, and to show this more distinctly I have had some of the photographs enlarged. But the subject of ornamentation as a whole in all the islands will be discussed later on.

No. 118, height 4.4 cm., small cup, with incised semicircles.

No. 119, height 4.6 cm., small cup, with incised lines.

No. 120, height 5.1 cm., small cup, plain, with two embryo handles.

No. 121, height 9.2 cm., bowl, with incised ornament and a button-like knob.

No. 122, height 9.5 cm., bowl, with incised and stamped ornament.

No. 123, height 10.5 cm., plain bowl, with partly flattened bottom.

No. 124, height 14.5 cm., bowl, with incised ornament.

No. 125, height 10.8 cm., bowl, with punctured ornament.

No. 126, height 12.1 cm., bowl, with punctured and incised ornament, also with a button-like knob.

No. 127, height 14.2 cm., bowl, with incised ornament and small button-like knob.

No. 128, height 16.6 cm., bowl, with stamped ornament and small button-like knob.

No. 129, height 14 cm., bowl, with incised concentric semicircles.

No. 130, height 19.7 cm., large bowl, thick walls, smooth, even surface, blackish, with incised ornament.

No. 131, height 14.6 cm., wide bowl, rim milled, incised ornament and flat button-like knob.


No. 132, height 16.5 cm., large bowl, with incised concentric semicircles.


No. 133, height 12.7 cm., funnel-shaped vessel, with incised ornament.

No. 134, height 16.5 cm., small jug, in bad condition.

ORNAMENTATION.

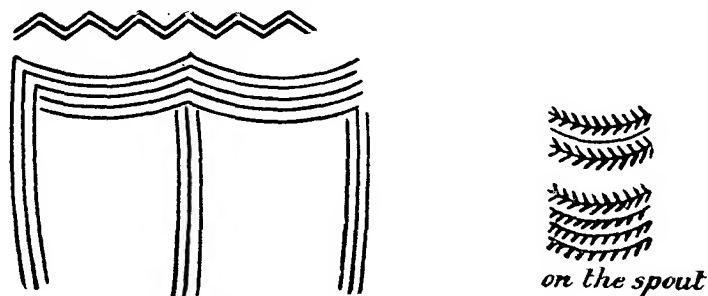
Fuerteventura.—The simplest form of ornament consists in vertical or diagonal lines made with a blunt point, and disposed continuously or with interruptions round the upper part of the vessel. Examples are seen on Nos. 2, 3, 4, 5, 9, 9 *bis*, 10, 15. But on No. 6 the incised lines are horizontal, and on No. 7, the incised lines form a chequer pattern made up of groups of lines alternately horizontal and vertical.

On No. 12 we find a rectangular meander  round the upper

part of the body, and at the base of the neck a ring of incised lines 

The most artistic development is seen on Nos. 13, 14, where the principal

ornament takes the form of festoons from which line-groups depend and form compartments. The scheme of No. 14 is here given diagrammatically.



Grand Canary.—None of the vessels with a round loop-handle (Nos. 18 to 37 inclusive) is decorated, except the cup No. 24, which has a red band round the rim and on the handle, and, further, is tooled nearly all over with short vertical grooves that might have been made with the rounded edge of a stone polisher.

None of the vessels with a thick handle pointed at the end (Nos. 38 to 50 inclusive) is ornamented except No. 49, which once showed a surface pattern of red vertical zigzags on a yellowish ground, now nearly effaced.

The group of examples with solid upright handles, sometimes perforated as spouts (Nos. 51 to 60), shows one instance (No. 56) of surface tooling, apparently made with the edge of a stone polisher, and a few instances of painted designs. No. 55 is decorated with broad diagonal bands, alternately plain, and shaded with horizontal lines of dark brown on a paler brown ground. No. 57 is red, faced with paler circles disposed over the surface. Another vessel of simpler form, but with similar handles, is ornamented with broad red chevrons pointing upwards, on a reddish-brown ground. No. 60 is red faced and shows four black stripes from below the neck to the bottom.

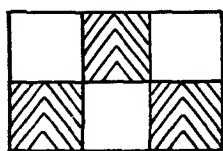
Of the flat dishes (Nos. 61 to 66 inclusive), No. 63 is ornamented on the sides with broad diagonal bars of red on a yellowish ground, and on the bottom with horizontal rows of large red triangles touching at the base. Plate No. 66 shows on the inside black concentric circles, the outer one composed of black standing triangles on a glossy red surface. The bottom presents a cruciform design shaded with black bars on glossy red.



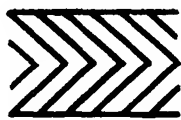
Nº 66

The group of vessels with slab-handles (Nos. 67 to 93) is the one most favoured by the decorator. No. 78 is red faced, but also tooled all over (like Nos. 24, 56) with short vertical grooves. No. 69, of a uniform glossy red, is covered with round spots, about 5 cm. in diameter, of a paler hue. No. 76, also of glossy red, is decorated with oblique bars in black.

The following designs are painted on other examples, but they are made from rough sketches and are nothing like facsimiles of the originals.



No 79



No 80



No 82



No 81



No 83



No 84



No 85

upper half effaced



No 86



No 89



No 90



No 91



No 92



*on a vessel
like No 93*



*on vessel
not shewn*

On No. 79 the pattern is red on brown; on No. 80 bright red on reddish yellow; of No. 81 I have no note; on No. 82 red on pale reddish; No. 83 red on yellowish; No. 84 red on yellowish-red; No. 85 bright red on paler red; No. 86 bright red or pale red; No. 89 bright red on a paler tone; No. 90 black on red; No. 91 bright red on blackish ground; No. 92 black on bright red; vessel like No. 93 black on red. The lattice pattern on a vessel not given here is bright red on a brown ground.

It is remarkable that there appears to be no example of incised ornament on the pottery of the Grand Canary.

Tenerife.—Of the 22 examples from Tenerife (Nos. 94 to 115) few are ornamented in the smallest degree, and of these one is doubtful and belongs possibly to Fuerteventura. Nos. 95, 113, 114 are ornamented with vertical incised line-groups, which are discontinuous.

In No. 96 the lines are diagonal, the rim is milled, and a small boss (perhaps there are two) may be regarded as ornamental. The small cup No. 99 bears a chequer pattern like that on No. 7, from Fuerteventura. The doubtful vessel, No. 101, has a chevron pattern surrounding the body, a little below the rim. No. 115 shows incised lines round part of the vessel, forming a scribble rather than a design.

Goméra.—The two vessels from this island are quite plain.

La Palma.—Of the 17 vessels from this island all but two are decorated, some of them profusely. The simplest ornament is on No. 124 where thin incised lines at wide intervals radiate from the rim. The jug No. 134 shows two pairs of horizontal lines at a considerable interval. On a curious looking vessel (No. 133) vertical bands, shaded with horizontal incised lines, starting from the base, converge towards the funnel.

A wide belt of horizontal lines is also seen on No. 121 where the rim is milled, and just below the lip is a row of small semicircular marks which seem to be in relief. In No. 130 the upper belt of horizontal lines is followed by a band of vertical lines in pairs, at considerable intervals, and bordered by a horizontal line.

Ornamentation by punctures is found on three vessels. The small cup, No. 119, shows three double rows of punctures arranged more or less horizontally. No. 125 has nine rows of punctures, and the rows are connected by fine diagonal lines sloping from left to right. The larger bowl, No. 126, is similarly decorated, though with a slight difference. Here each set of three rows of punctures is separated by a band of fine horizontal lines, and only the rows in each set of three are united by fine oblique lines. The lip is milled, as in some other instances.

Semicircular lines, either alone or in combination with other forms, are to be seen on four vessels. The small cup, No. 118, is covered with concentric semicircles made with a blunt instrument. The upper half of the large bowl, No. 129, is nearly covered with a row of concentric semicircles, while the lower half shows a large chequer pattern of alternate horizontal and vertical line-groups. All these lines are made with a blunt-pointed instrument. Round the centre of the vessel is a row of small semicircular marks, like those on No. 121. On No. 132 the ornamentation is best understood from the photograph. The semicircular double lines seem to have been made with a hollow reed split in half. Such an instrument would make the round terminations of the lines and account for their being double with a raised space between. On No. 131 the lines are made roughly with a blunt instrument and the semicircles are imperfectly rendered. Just below the lip is a band of single vertical lines at short intervals, with round depressions at top and bottom of each interval. The bowl, No. 127, is entirely covered with horizontal bands, partly of fine parallel lines, partly of short vertical or diagonal incisions. There is also a small button-like knob in one aspect of the vessel.

Impressed ornament exists on two examples. The surface of No. 122 is rubbed and worn down in places but still we can observe bands of square depressions, something like those made with a notched stick that are so usual on beakers in Great Britain and the Continent. But here they are made in a different way, apparently with some kind of stamp. These marks are better seen on No. 128, though in places they have been obliterated by a rope, which has been partly coiled round the bowl and has left a series of diagonal depressions on the wet clay. Near the bottom of the vessel there is a place where one set of square holes meets another set at a slight angle, as might happen in trying to adapt a quadrangular stamp to a spherical surface. There are fragments of similarly ornamented vessels from La Palma in the museum at Las Palmas, Grand Canary.

THE MAKERS OF THE POTTERY.

The anthropologists who have occupied themselves with the anthropology of the Canary Islands are not agreed upon all points. But there is a consensus of opinion that the natives were a mixed people containing at least three well-defined types, and the intermediate forms that arose from intermarriage.

1. A tall (1.70 to 1.80 m.) strongly built race of Cro-Magnon type with the large average cranial capacity of 1,672 c. cm.

2. A shorter dolichocephalic and mesocephalic race of slender build with black hair, brown eyes, and light brown skin.

3. A short brachycephalic race with slender bones, and probably dark eyed.

Dr. Verneau applies the term "Guanche race" to the first element of the population, of Cro-Magnon type, and this term has been accepted by others. Dr. Verneau, Dr. Hans Meyer, and Von Luschan believe that the race had a white skin, and probably light chestnut hair and blue eyes. Sergi dissents from this opinion as unproved. But it seems to be partly confirmed for Tenerife by Espinoza, who lived for a good many years on the island, and mentions that the people to the south are of rather a brown colour, but to the north they are white, and the women are beautiful and rosy, with long hair.¹

The second type is termed Semitic by Dr. Verneau, but Hamitic by Meyer, Von Luschan, and Sergi.

The third type is called "Armenoid" by Von Luschan and Meyer, but both Verneau and Sergi find too considerable differences between the short heads of the Canary Islands and those of Western Asia to subscribe to this opinion.

Dr. Verneau brings the people of Cro-Magnon type from Europe, *viâ* Spain and North Africa, Sergi from Africa, and Meyer from Western Asia, *viâ* the Isthmus of Suez. In the opinion of Dr. Verneau the amalgamation of the three races may have taken place before the first colonization of the Archipelago. But Dr. H. Meyer believes it possible that the small brachycephalic people represent

¹ *The Guanches of Tenerife, etc.*, by Fr. Alonso de Espinoza, Hakluyt Society (1907), p. 32.

the earliest inhabitants of the Canary Islands, and that the Guanche race preceded the Hamitic.¹

As regards the cephalic index of three of the islands, Dr. Verneau gives the following statistics which I here quote from Sergi, as he has reduced the five head-forms of Verneau to three.²

TENERIFE.					
	<i>Male skulls.</i>				Per cent.
Dolichocephalic	37·00
Mesocephalic...	40·70
Brachycephalic	22·30
	<i>Female skulls.</i>				
Dolichocephalic	16·67
Mesocephalic...	58·33
Brachycephalic	25·00

GOMÉRA.					
	<i>Male skulls.</i>				
Dolichocephalic	15·39
Mesocephalic...	45·15
Brachycephalic	38·46
	<i>Female skulls.</i>				
Mesocephalic...	25·00
Brachycephalic	75·00

At Grand Canary are found according to locality:

Dolichocephalic	...	...	from 25·00 to 50·00
Mesocephalic...	...	...	„ 17·00 „ 75·00
Brachycephalic	...	...	„ 5·88 „ 12·50

These percentages show that the three types of skull were not equally distributed among the islands. Dr. Verneau found the Guanche race in all the islands, but least mixed in Tenerife. The second element occurred chiefly in the Grand Canary, Palma, and Ferro, but not in Goméra, where the short-skulled race was predominant. There seems to be no information regarding the craniology of the natives of Fuerteventura and Lanzarote, as neither Verneau nor Chil give any particulars, but the Spanish conquerors remarked that they were the tallest and best built of all the islanders, and were of dark complexion.³

¹ Verneau, *op. cit.*, p. 103 ; *Die Insel Tenerife*, by Dr. Hans Meyer (1896), p. 42.

² *The Mediterranean Race*, by G. Sergi (1901), pp. 132, 133.

³ *History of the . . . Canary Islands*, by George Glas (1764), p. 6.

THE PROBABLE PERIOD OF THE FIRST COLONIZATION.

The first colonists seem to have arrived at a fairly early period. When the natives became known to Europeans in the fifteenth century their weapons were no better, indeed in some respects inferior, to those of the blacks of Australia. They consisted of clubs, knob-sticks, and long wooden spears with the points hardened in the fire, though sometimes tipped with a horn or stone point, and slings. But the natives had no shields till they learnt the use of them from Europeans, no spear-throwers, and no bows and arrows. Other arts of civilization were unknown. They had not learnt to spin or weave, and though they ground corn into meal they ate it raw from inability to make bread. Although milk was a staple diet they never thought of making cheese.

Their cutting instruments were of obsidian or of basalt. The former is found in only a few rare localities in Tenerife and Grand Canary, but basalt occurs nearly everywhere. Dr. Verneau remarks that with the exception of a few pieces, the stone implements were very roughly worked, the best hardly showing a few retouches. Basalt splits easily into triangular prisms with a sharp cutting edge, and so was the stone usually employed for making knives without much trouble. The axes, which appear to be very rare, are of two types: those worked on both faces and comparable to the almond-shaped axes of Saint Acheul; those worked on one side only belonging to the type of Moustier. Verneau found both types on the surface in the same cave, thus showing that the forms are contemporary.¹ Both types are sometimes found together in Algeria and Tunisia under circumstances which prove that they are contemporaneous. The obsidian splinters never show retouches, and the best specimens are not to be compared with the commonest pieces of obsidian from Mexico.¹

The Guanches of Tenerife never polished their stone implements, but four polished flat axes of chloromelanite have been found in the Grand Canary and one in Goméra. Three have a semi-circular cutting edge, while the other extremity ends in a point. The other two, one of which is scarcely 5 cm. long, have a less convex cutting edge and taper towards the other end, not to a point, but to a rectangular surface slightly convex.¹ The first type is well known in Europe, where the material is often jade or jadeite, and is contemporary in France with megalithic monuments. The fact that the Canarian polished axes are of chloromelanite gives a clue to their origin. Axes of this mineral are not uncommon in Italy, Switzerland, France, and other parts of Europe, and Franchi, quoted by Peet, has proved that chloromelanite and jadeite occur in position in various parts of the Western Alps and of the Ligurian Apennines.²

Although Pallary has found implements of Palæolithic type at various points along the coast of Morocco from Tetuan to Mogador,³ we are not to suppose that

¹ Verneau, *op. cit.*, pp. 60, 61, and in *Bull. S. Anthropol.* (1887), pp. 652-654.

² *Stone and Bronze Ages in Italy and Sicily*, by Eric Peet (1909), p. 154.

³ Paul Pallary in *L'Anthropologie* xviii, pp. 301-314; xix, pp. 167-181.

any of their makers passed over to the Canary Islands. The Canarian implements of Mousterian type, judging from their description, have only this in common with the true type, that they are worked on one side only. But this in itself is no true criterion, for the tanged arrow-heads of North Africa and the Sahara of the later Neolithic period have always one side unworked. In fact, the stone implements of the Canary Islanders leave the impression that they belong to a time when the art of chipping stone was in its decadence, and that the very few examples of Acheulean type were made to serve a special purpose, and are not representative of true Palæolithic art. Again, it must be taken into account that the two intermediate epochs between the Mousterian and the Neolithic, viz., the Getulian and Iberomauresian of Pallary, are wanting.

Other reasons, too, stand in the way of supposing that the islands were inhabited at so early a date as the Palæolithic period. There were no native mammalia in the Archipelago before their introduction by man, and the natural resources of the vegetable kingdom were very inadequate as a food supply.¹ It is true they might have subsisted on fish and shell-fish, but no shell-mounds are known except on Ferro, so remote from the mainland that it is impossible to suppose it was the first island to be peopled, although the shell-mounds of Tunesia and Algeria belong to the Getulian, or latest stage of the Palæolithic period in North Africa.

It is therefore in some part of the Neolithic period, which lasted for an immense time in North-West Africa, where there was no Bronze Age, that in all probability we must place the first colonization of the Archipelago. Pottery, though rare, was known in the "Mauretanian" of Pallary or the earliest part of the Neolithic period. It was well baked, carefully polished, and had a conical or rounded bottom; the decoration was confined to the upper part of the vessel, and impressions were made with a sharp or blunt point or with a stick cut square. But Pallary does not bring in the apparition of the horse, sheep and dog till the beginning of the "Berber" period, allowing a hiatus, during which caverns were abandoned, between this and the "Mauretanian." In the "Berber" period, implements were of coarser workmanship than in the previous period, and the massive arrowheads are always worked on one side only. Axes were polished; the predominant form had a body of circular section, but these implements were rare.²

If we place the first colonization of the Archipelago at the very beginning of the "Berber" period, it would allow time for some progress to be made in the art of navigation, which would permit of a passage to the nearer islands. It would also account for the introduction of the hairy sheep (a purely African breed, and the only one bred by the Imoshagh of the Sahara), the goat, the dog, and the pig, all of which were known to the natives of the Canary Islands. It is remarkable that the

¹ Dr. Hans Meyer, *op. cit.*, p. 30.

² *Instructions pour les recherches préhistoriques dans le nord-ouest de l'Afrique* par Paul Pallary, pp. 96, 97, 46-49, and Dr. E. Gobert in *L'Anthropologie*, xxiii, 159.

colonists brought no bows and arrows, but in some Neolithic stations of North Africa arrowheads are missing. At this stage, pottery was fairly common on the adjacent continent, so it is to be expected that the art of manufacturing it was known to the first immigrants.

Placing the first colonization at the beginning of the middle section of the Neolithic period, might permit us to believe the polished flat axes of chloromelanite are contemporaneous with the advent of the first colonists. For as the art of navigation in small craft was known, it is possible they arrived at intervals in batches, and gradually passed from one island to another.

Since these axes could only have been brought from Europe, those who introduced them would be either the men of Cro-Magnon type, or the short-headed immigrants. Taking into consideration that chloromelanite is found *in situ* in the Western Alps and in Liguria, where a brachycephalic population has long resided, it may be that the short-headed colonists imported the axes, especially as one is from Goméra, where the brachycephalic element was very strong. It may here be remarked that there is some evidence to show that the Goméran language differed from that of the other islands. Of the three words recorded by Galindo, to which a meaning is attached, none appears to be related to a Berber dialect. In the modern Berber of North Africa, and in nearly all the Hamitic languages, there is no *p*, but in Goméra, at least 19 words containing *p*, mostly place or personal names, have been noted. This number is large when the small area of the island is taken into consideration. For instance, Palma, which contained no brachycephalic element in its population, is about twice the size of Goméra, and yet only one *p*-word is known from that island. And in the Grand Canary, which is nearly four times as great as Goméra, only four *p*-words have been recorded; in Fuerteventura, about four and a half times the size of Goméra, six words; in Tenerife with an area about five times as great as Goméra, 22 words. This large disproportion of *p*-words in Goméran, compared with what is found in the other islands, points perhaps to a possibility that the Goméran language was brought from Europe by the brachycephalic strain in the population of the island.

Dr. Verneau appears to bring the Cro-Magnon type directly from Dordogne by way of Spain, first into Africa, and from there to the Canary Islands. But in that case it is not quite clear that the race was white-skinned, with chestnut hair. Dr. Ripley presumes that Cro-Magnon man was of dark complexion with black hair and eyes, basing his opinion upon the modern descendants of the type in Dordogne, where the percentage of black hair is very considerable.¹ Now there is some evidence, apart from the statement of Espinoza mentioned above, that though the Guanche type may have had a reddish-yellow tint of skin, like that of southern Europeans and the Imoshagh or Tuaregs of the Sahara, yet their hair was black. The poet Viana describes Bencomo, the last king of Tenerife, whose headquarters lay

¹ *The Races of Europe*, by William Z. Ripley (1900), p. 466.

in the northern half of the island, as of brown or swarthy (*moreno*) complexion with black eyes. His brother Tinguaro was like him in appearance. Bencomo's two daughters have faces white as snow, with golden hair; one had emerald green eyes, the other pale blue eyes. Guacimara, daughter of the King of Anaga, at the extreme north end of Tenerife, is pictured as rather brown (*moreno*), tall and robust, with red hair, black eyes and thick lips.¹ Here the swarthiness of the king, who was an old man of seventy with a white beard, may be attributed to long out-of-door exposure, but his black eyes and those of Guacimara connote black hair. The daughters were light skinned, but their golden hair may have been dyed, for Cedeño and another contemporary writer both mention that the natives of the Grand Canary reddened their hair with lye. And it is quite probable that the same fashion existed in Tenerife. In connection with the Spanish word *moreno*, it is not without significance that in the language of Palma the equivalent was *azugahe*, which is clearly of the same origin as the Shilha *azuggagh*, signifying in all the Berber dialects "red." By *moreno* we may therefore understand "reddish-brown," the characteristic colour of Hamitic peoples, and the tint which a reddish-yellow skin would acquire after long exposure to sunlight and air. Assuming then that the natives of Guanche type were relatively fair skinned with black hair and eyes, though occasionally these were light, it is possible to connect them somatically with the tall, dolichocephalic, muscular, black-haired, reddish-yellow skinned Imoshagh of the Sahara. As the shorter dolichocephalic and mesocephalic element can be brought into connection with some of the Berbers of North Africa, it also is of African origin. Hence both the first and second component parts of the population may have arrived together, or with a short interval between. From this point of view the importation of the chloromelanite axes must be ascribed to the short-headed colonists, and from an archæological standpoint it would seem there is nothing to hinder our supposing that they reached the islands about the same time as the other two types of population, namely, at the beginning of the middle portion of the Neolithic period in North Africa and before the art of navigation was lost. For, after a time, it had evidently fallen into disuse, and intercommunication between the islands was brought to a close. Perhaps this is not to be wondered at, for the heavy swell caused by the prevailing north-east trade wind made navigation in primitive craft a matter of considerable danger and difficulty.

There is indubitable archæological evidence, however, of one or perhaps two visits to the Archipelago by a people who used ships, at dates long after its first colonization. The first is the existence of undoubted inscriptions in the Lybian character that have been noted by Verneau in the Grand Canary and Ferro. He supposes, with considerable probability, that these inscriptions may have been cut by some of the Numidians who formed the expedition sent under the auspices of King Juba II. (who reigned between 46 B.C., and 19 or 24 A.D.) to explore the islands.

¹ Antonio de Viana, *Antigüedades de las Islas Afortunadas de la Gran Canaria, etc.* Edited by F. von Loher, *Bibliothek v. litter Vereins in Stuttgart*, cxlv (1883), pp. 63, 64, 76, 77, 97, 81.

This view is preferable to another that he hints at, namely, the possibility of these inscriptions having been cut in the time of Hanno by Numidians in the service of the Carthaginians. For it is not certain that the Lybian script had come into being at so early a date.

The other evidence consists in the *lava querns* with an upper and lower stone found in all or in most of the islands. In some of these handmills the central aperture of the upper stone is surrounded by a raised rim from 4 to 6 cm. high, all in one piece. The type is still in use in Algeria and might have been introduced in the time of Juba II. or even later.

THE CANARIAN POTTERY PROBABLY INDIGENOUS.

From the above remarks it is evident that in all probability the first colonists brought a knowledge of the art of making pottery with them. But in each island its form and decoration followed a line of its own, though we may observe that in Fuerteventura and other islands, where the incised technique was current, the ornamentation was generally confined to the upper part of the vessel, as in the early Neolithic pottery of North Africa. Dr. Verneau supposes that the coarse pottery of simple form, such as Nos. 106, 107, 108, and several others of the same type from Tenerife, were specially the handiwork of the Cro-Magnon element of the population, and he is inclined to ascribe to it all the rudest vessels in all the islands. But this view I believe is hardly tenable if we compare vessels from the northern and southern halves of the island. Though No. 106 is from Santa Cruz in the northern half, No. 108 is from Granadilla in the southern half, where, according to Espinoza, the browner natives lived. Other vessels from the northern half are Nos. 97, 115, both from San Andreas, and No. 113 from Icod. Two of these vessels are very slightly decorated. To the southern half belong Nos. 99, 103, 111, all three from Arico, No. 105 from Aldea de San Miguel, No. 100 from Tamaino, Valle de Santiago, and No. 114 from Usiame, Guia. Here also two examples are ornamented, the others are plain. To about the centre of the island belong Nos. 98, 107, both from Guimar. The purpose for which any piece of pottery was destined, whether to be used on the fire for boiling or as a receptacle for holding milk, meal or other food, must have determined in some measure both its form and the suitability or not of its being ornamented. Vessels intended to be used as pots on the fire were necessarily plain, and had a conical base, so as to be well supported by the three stones which stood in the centre of the fireplace. The handle was nearly upright so as to be more out of reach of the flame, and was sometimes hollow in order to receive a wooden handle. But bowls, cups and other types meant for domestic or ceremonial use were liable to be ornamented, and the position of the handle could also be changed.

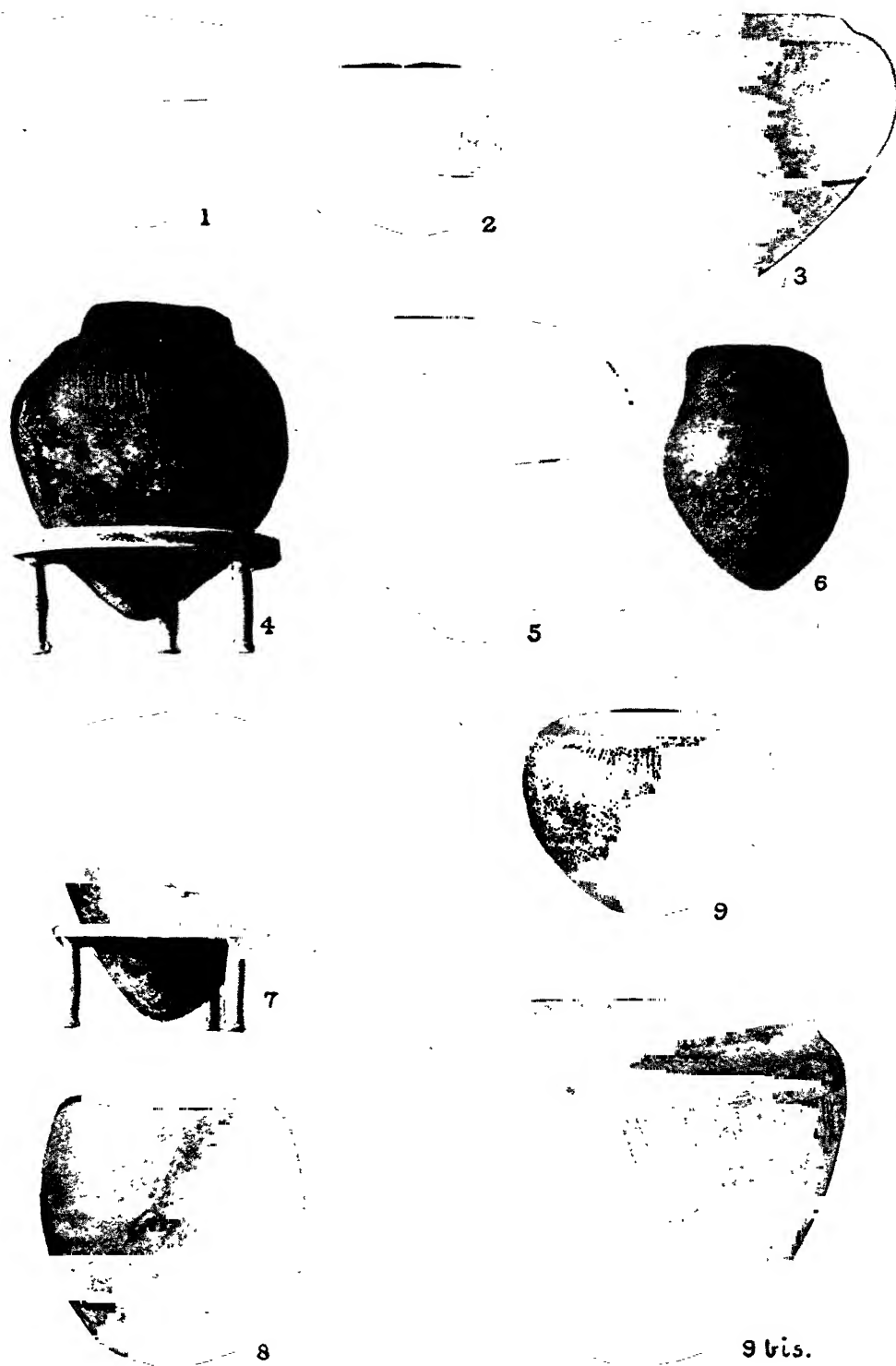
The painted ware of the Grand Canary is such an advance upon the pottery of the other islands that we have to consider whether it is of indigenous origin, and of local development, or the result of the immigration of a people at a higher stage of

civilization. Although the Spaniards recognised a higher standard of culture in the natives of the Grand Canary, their arms were no better than those of the other islanders. The majority of them went naked, or merely girt round the loins with a fringe of palm leaves, and, like the other natives, they were ignorant of the art of making bread, of spinning and weaving. Bontier and Le Verrier, who accompanied the expedition of Jean de Béthencourt in 1402, observed that most natives of the Grand Canary had their faces ornamented with different designs, according to the fancy and taste of each individual.¹ It seems a short step from painting a human face with red ochre to painting the face of a piece of pottery, and the Grand Canarians may have taken it spontaneously, without suggestion from an external source. All the ceramic types on which painted geometrical designs are seen (such as Nos. 55, 57, 60, 80 to 86) appear to be of native origin, and derived from a simpler bowl-shaped form. Certainly Nos. 55, 56 are not far removed from it, and a slab-handle perforated with a hole, which is so characteristic of the type Nos. 80 to 86, is seen on an uncoloured bowl such as No. 47. None of the examples (Nos. 80 to 86) have a really flat bottom. It is really convex, and might derive from a form like No. 93, by lowering the lower half of the body and flattening the sides of the upper half in order to make a better surface to paint upon. An intermediate form may be observed in 87, where the lower half has been reduced in height, but the sides remain concave. Nevertheless, it is remarkable that no example of incised pottery has yet been found in the Grand Canary, though it is possible that the technique once existed. On the African continent there is another area where a similar phenomenon may be seen. The modern Kabyle pottery of Algeria is ornamented solely by painting, and never by incised lines. But this fact is, I imagine, a coincidence, and can hardly be brought into connection with the absence of incised linear ornament on the ceramic of the Grand Canary.

CONCLUSION.

The above remarks may be summed up as follows: The Canarian Archipelago was first colonized in the second stage of the Neolithic period (the "Berber period" of Pallary) by a people who spoke a Berber dialect, for the native words for *sheep*, *goat*, *pig*, *barley*, *wheat* are all nearly related to the corresponding words in that branch of Hamitic, and were acquainted with the art of making coarse pottery of elementary form. These colonists would belong to the short dolicho- and mesocephalic stock of Hamitic type, or to the tall Cro-Magnon type. Both were of African origin, and may have arrived together, or at short intervals. The short-headed people must apparently be brought from Europe, and their language differed from that of the other islanders by containing many *p*-words, a sound not used in Berber or in most of the Hamitic group of languages. But archaeological

¹ Dr. Chil y Naranjo, *op. cit.*, p. 607.





FUERTEVENTURA.



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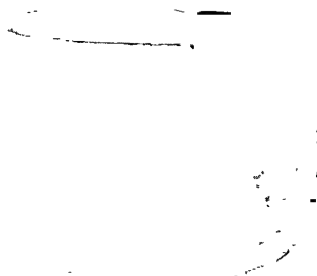
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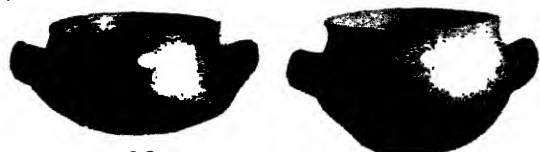
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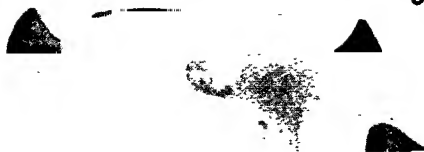


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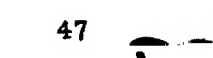
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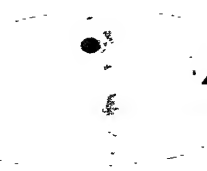
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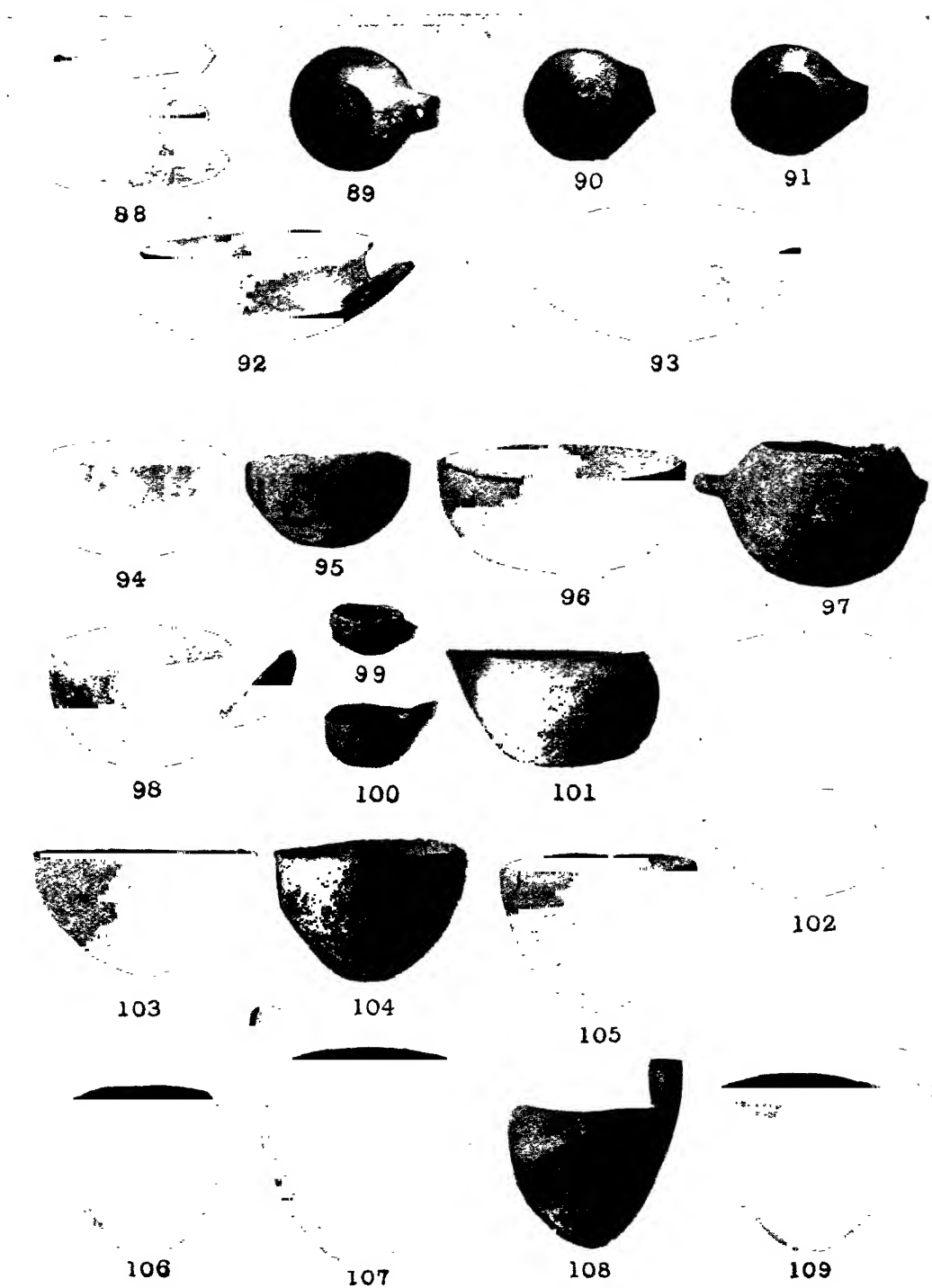
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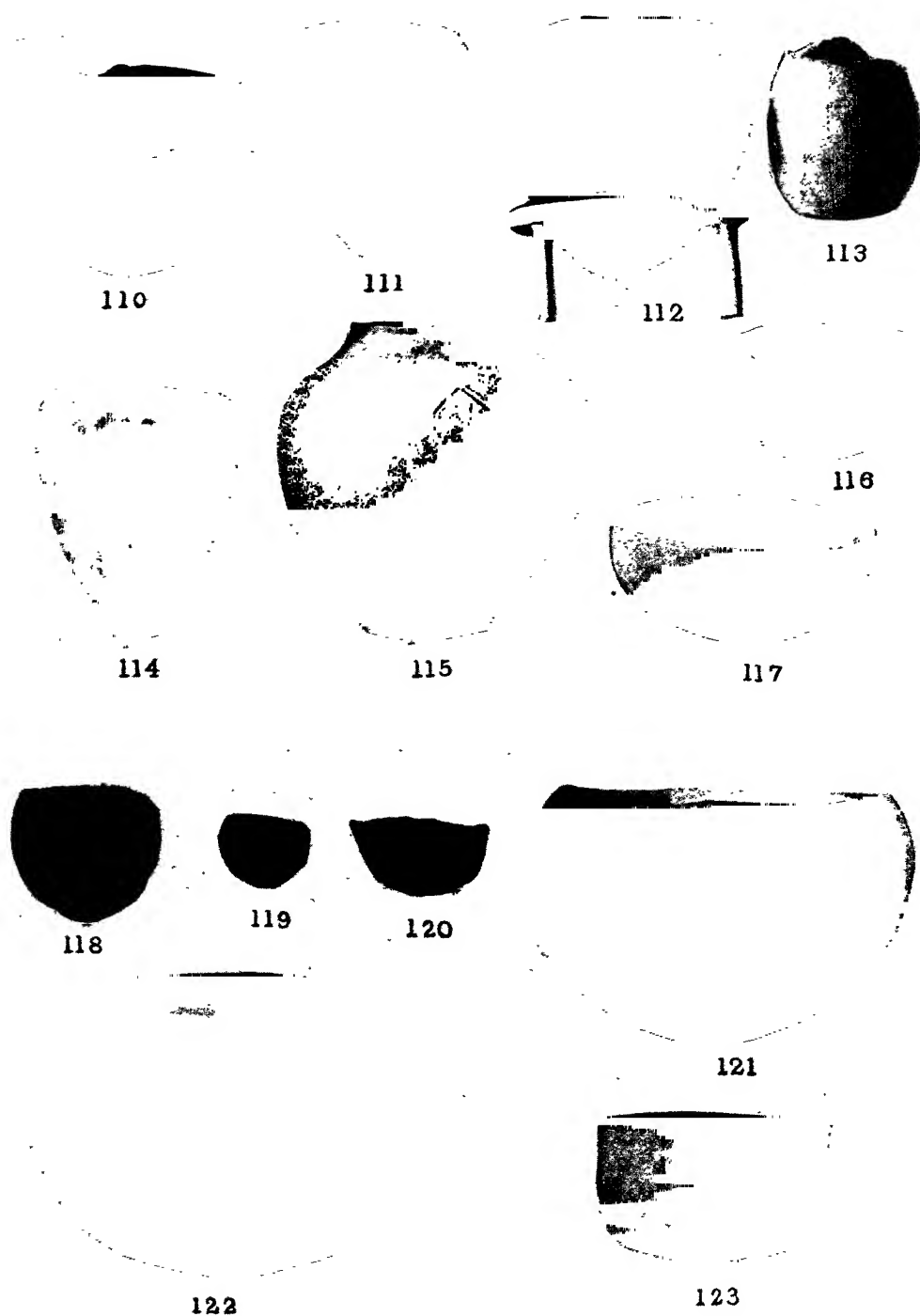


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88-93 GRAND CANARY.

94-109 TENERIFE.



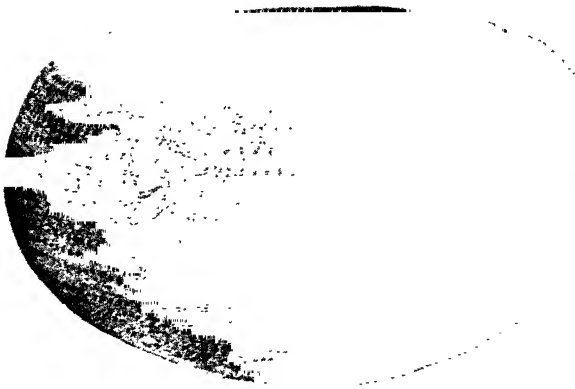
110-115 TENERIFE. 116, 117 GOMÉRA. 118-123 LA PALMA.



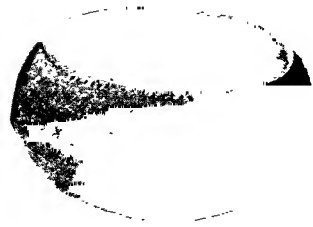
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LA PALMA.



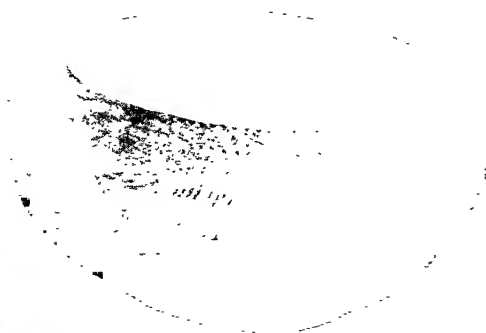
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LA PALMA.

considerations show that they may have reached the Archipelago about the same time as the other two elements in the population, at any rate, before the art of navigation had ceased to exist.

NOTE.—The plates illustrating this paper have been kindly presented by the Author.

MAGIC AND WITCHCRAFT ON THE CHÔTĀ-NĀGPŪR PLATEAU— A STUDY IN THE PHILOSOPHY OF PRIMITIVE LIFE.

BY SARAT CHANDRA ROY, M.A., B.L., RANCHI.

A.—INTRODUCTION.

THE man of the lower culture is, in a sense, more spiritually-minded than his fellow-man of a higher civilization. To him things are not what they seem; everything, animate or inanimate, in this visible universe is to him merely the receptacle—the “*pind*” or seat as the Orāon of Chôtā-Nāgpūr calls it—of a spiritual energy; and man’s main concern is with this world of spiritual energies or powers. As for the invisible world, it is, to the Chôtā-Nāgpūr aboriginal, as full of disembodied spirits “as a tree is full of leaves.” It is not only every human being nor merely all that we call living beings, but, in fact, all things either created by God or made by the hand of man, and even such immaterial things as the spoken word, an expressed wish, a passing thought or emotion, a magic formula, certain proper names and class-names, and an odd number or an even number, that possess each its individual soul or its special spiritual energy.

Indeed, soul, spirit, energy, and power are generally convertible terms in the primitive vocabulary. To the Chôtā-Nāgpūr aboriginal the soul is not a purely spiritual intelligence, absolutely formless and unsubstantial, but it is rather what may be called a spirit-substance. This spirit-substance or soul-stuff, whether residing in aerial or in human bodies, is believed to resemble the human shadow in its form, and to influence men or cattle for good or for evil by “overshadowing” them. The soul-stuff residing in other beings or natural objects resembles animal-, vegetable-, or mineral-poison in its mode of action. It distils particles of its virtue which flow on into another person, animal, or object, either by contact or by sympathetic attraction. And the absorbing care of the aboriginal of Chôtā-Nāgpūr, as of other countries, is how best to defend himself and his family, his cattle and his crops, his house and his other belongings, against the subtle influence of such baneful energies and the poisonous malice inhering in most human and non-human souls and spirits.

Although everything animate or inanimate is, for the primitive man, instinct with spirit or spiritual energy, it is not every energy that is equally active. Some are intensely active, others less so, and yet others are almost dormant but liable to be aroused into helpful, or what is more common, harmful activity at any moment. It is only the more active energies for the time being that count.

In the human world, it is the different human groups or village-communities and Pārḥā-federations around him, as also certain persons with particularly strong individuality or soul-power, or, in the words of the Orāon, men of "heavy shadow" (*Jabar Chhāin*), and persons possessing occult powers, as well as strangers in general, that the Orāon or Mündā of Chōtā-Nāgpūr takes account of, and either avoids, defies, or forms ceremonial alliances with.

In the animal, vegetable, mineral, and planetary worlds, and even with respect to the elements and to certain artificial objects such as weapons and implements, and intangible things such as name and number, such alliance with good powers and avoidance and control of evil powers take the form of Totemism, cattle- and tree-worship, charms and amulets, and *chhūt* or touch-*tabus*, food-*tabus*, and other *tabus*. In the super-physical world, it is the disembodied spirits of the departed and the unembodied spirits of various orders of supernatural beings, which either hover about in the air or take their seats temporarily or permanently in some natural objects, that have to be reckoned with. Alliance with these is formed by sacrifices and ceremonial eating and drinking with them.

A study of the two principal aboriginal tribes of Chōtā-Nāgpūr—the Mündās and the Orāons—inclines one to think that the same principles that underlie their social and religious systems, underlie, to some extent, their ideas as to magic and witchcraft as well. As the idea behind their social and tribal organization is alliance with the helpful village-communities around them for protection against hostile communities, and the idea behind their religious system is alliance with the highest and most helpful spiritual entities they know of, and, through them, control of the harmful ones, so the idea behind their magico-religious system appears to be the need of an alliance with the helpful forces and powers, and avoidance and control of the harmful influences and energies, of their physical and super-physical environment. In this paper I shall first briefly refer to a few points in the social and religious systems of the Orāons to illustrate this proposition, and then proceed to notice some of their practices regarding magic and witchcraft, and the principles that appear to underlie them.

B.—THE PRINCIPLE OF ALLIANCE.

(I.) *Direct Alliance.*

Of good powers, those of the invisible world—the world of spirits—are necessarily the most powerful. The Orāons and the Mündās of Chōtā-Nāgpūr seek alliance with the good spirits or deities by periodical ceremonies, of which the most salient feature is the worshippers eating together the liver of the animal or fowl sacrificed to the deity, and drinking together rice-beer, after a portion of both the liver and the rice-beer has been offered to the deity. The liver is considered by the Chōtā-Nāgpūr aboriginal to be the seat of the vital principle, as is indicated by the belief that the witches sometimes mysteriously extract the liver of a person, and as soon as his liver is eaten up the person dies. The blood, for

which the rice-beer is apparently a substitute—for on certain important occasions such as a purificatory ceremony sacrificial blood is actually drunk—is identified by the Orāon and the Mūndā with the soul or spirit, as is indicated by their belief that an evil spirit sometimes attacks a person by appearing as a blood-spot on his clothes. And this sacramental eating and drinking with their deities may not improbably be a modification of an older practice of offering up a member of the tribe, and ceremonially eating with the gods the human meat and drinking the human blood by way of sealing a compact of alliance and friendship.¹ Totemistic ideas may have helped in identifying the man with the animal or the fowl sacrificed. The practice of *Ōndkā* or human sacrifice, it may be noted, is said to linger to this date in out-of-the-way places in Chōtā-Nāgpūr. Whether this ceremonial eating of the sacrificial meat be a case of eating with the god, or, as is not unlikely, of “eating the god,” the sacrifice being considered as ‘partaking of something of the nature of the deity, and the consumption of the meat calculated to impart to the eaters something of the strength and other virtues of the god, such ceremonial compact or alliance with the deities through a sacramental meal is renewed at stated intervals by similar sacrifices and sacrificial meals. Delay in renewing the alliance may turn these supernatural allies into temporary enemies, and, in such a case, more than the ordinary sacrifices is required to convince them of your sincerity, and thereby placate their wrath and restore the old terms of friendship and alliance.

The principle of alliance with helpful powers may be further traced in the Orāon’s social system. Ceremonial alliances of one individual with another, and one village-community with another village-community or groups of village-communities, still form a characteristic feature of the Orāon social system. The Orāon Pārkhā system of federated village-communities appears to have originated in a ceremonial alliance between different local groups—originally, it seems, hunting groups, and now agricultural villages—with the object of mutual help and protection. Although nowadays the men of different village-communities of an Orāon Pārkhā union do not join in common sacrifices and ceremonial feasts except on rare occasions, yet even to this day when sacrifices are offered in any village of the Pārkhā to the village-deity or Gāon-deōti, portions of the sacrificial meat are distributed to other villages of the Pārkhā. The eating of this sacrificial meat keeps up and cements the Pārkhā alliance. Such meat is called *khāonro*, or *sandēs*. Again, on the social side, when a member of an Orāon Pārkhā is fined by the village *Panch* for some sexual or other offence against tribal custom, goats or fowls are purchased with such fine, and the meat is distributed amongst the different villages that constitute the Pārkhā. Not long ago the members of a Pārkhā generally used

¹ It may be noted that on the occasion of the annual *Marāng Būrū* hunt of the Santāls of Chōtā-Nāgpūr, held on the Parasnāth Hill, the *Dihri* or priest and manager of the hunt has to dip grains of rice into blood drawn out of his own body and offer such rice to the spirits believed to reside at different spots on the hill. This rite, known as *bail-bichchi*, is probably a modified survival of the practice of offering human victims.

to assemble on occasions of such religious and social feasts of the villages of the Pārḥā, and cement their alliance by actually eating and drinking together. But, in these days, except for the discussion of matters of unusual importance for the Pārḥā, such gatherings are rarely held.

It is not only the different villages of the same Pārḥā that are bound together by a ceremonial alliance, but every Pārḥā enters into such alliance with some village belonging to another Pārḥā. Such a village is called the *dūdḥ-bhāyā* (foster-brother) village of the latter Pārḥā. The Orāon *Bhūinhārs* of such a *dūdḥ-bhāyā* village are regarded as blood-relations of those of the villages of the Pārḥā of which it is a *dūdḥ-bhāyā*, and, as such, are not permitted to enter into matrimonial relations with them, though otherwise competent to do so. The villages of a Pārḥā and their *dūdḥ-bhāyā* village are required to stand by each other as brothers, and allies in their struggles and wars with other Pārḥās. In these days such struggles or fights can only take place over rights to game killed at the tribal hunting-excursions, and over the right to use a flag of a particular pattern by a particular Pārḥā, to the exclusion of other Pārḥās at their inter-tribal dancing festivals, known as *Jātrās*.

If the rites and ceremonies in connection with the formation and renewal of Pārḥā alliances have now fallen into practical disuse, elaborate rites are still observed in the case of ceremonial friendship between individuals, especially between married Orāon women. Such a ceremonial friendship is not merely a matter of individual choice, but is regarded as a matter of tribal necessity. At the interval of three years or so, the ceremony known as *Sahīāro*, or the selection of *sahīās* or friends, is celebrated in the Orāon country. Information is sent round by proclamation at the different village-markets, where men from many villages assemble, that in that year *sahīā* alliances have to be formed or renewed amongst Orāon women. Each village then fixes its own day, preferably a Tuesday, for the ceremony. On the appointed day at least one female member of each Orāon family in a village must enter into *sahīā* alliance with another Orāon woman. Either her relationship with a former *sahīā* has to be renewed, or a new *sahīā* has to be selected. In the latter event, the relationship with a former *sahīā* does not, however, cease. Both in the case of the formation of a new *sahīā* and in the case of the renewal of an old *sahīā*-ship, the same elaborate and interesting rites and observances have to be gone through. The essential features of this ceremony are the ceremonial procession with which each of the two would-be *sahīās* in turn goes to the house of her *sahīā*-elect—blesses the house by sprinkling, with an auspicious mango-twigs, water on the roof of the house and the doors which are closed against her—signifies her good-will and desire for alliance and friendship by putting on the door-sill marks of rice-flour, and, over these, marks of vermilion—and finally fastens sheaves of paddy to the door-frame by way of wishing prosperity to the house; the *sahīā*-elect, thus assured of the good intentions of this candidate for friendship, then opening her doors and coming out to meet her—taking on her own wearing cloth a few drops of the benedictory water trickling down from the roof—the

two women saluting each other and addressing each other by the sweet name of "*Sahiā*"; and on a subsequent day all the newly-made *sahiās* of the village assembling at the Devi-āsthān, or shrine, of the village-deity known as Devi-māi; and after offerings to the deity, each woman exchanging her plate of flattened rice and curdled milk (*dahi-chiurā*) with her *sahiā's*, and both the *sahiās* eating together; and finally, the *sahiās* entertaining each other to dinner at their respective houses and exchanging presents of new clothes. Thenceforth the names of the two *sahiās* are *tabu* to each other, and there can be no inter-marriage between the families of the two *sahiās*. The reason why so much importance is attached by the Orāon to such artificial friendship between women of his village appears to be the necessity for such alliances between women who have been taken in marriage from different villages and different septs, and who are not, therefore, expected to be naturally friendly to one another. Men, too, enter into ceremonial friendship with each other, but in their case the ceremonies are not so elaborate, nor the alliance considered a matter of tribal necessity, although matrimonial relations between the families of two male friends are no more permissible than between those of two female friends.

Judging from an analogy with these ceremonial alliances between man and the gods, and between human beings *inter se*, one would be inclined to think that the institution of Totemism had also for its basis a similar principle of alliance. Chōtā-Nāgpūr facts would seem to indicate that when primitive man found by experience that certain animals, plants, minerals, and other objects proved particularly helpful or inconveniently powerful and hostile, he sought by ceremonial alliance with such animal, plant, mineral, or other object to become "of one blood" with it, and thereby to secure its help and protection, or disarm its ill-will and hostility. It may be noted that according to Orāon tradition, no tiger would in olden days harm a man of the tiger-sept (Lakrā gōtra) as both the man and the tiger were "of one blood," but when men became untruthful and whoever came across a tiger would aver that he belonged to the tiger-sept, tigers naturally grew suspicious of the veracity of man, and ceased to spare even an Orāon of the Lakrā, or tiger, gōtra, for the simple reason that they could not distinguish a true Lākra-gōtra man from the mere pretender.

In Chōtā-Nāgpūr, however, Totemism has long ceased to be a living institution except in its relation to exogamy, and it would, therefore, be unsafe to hazard anything like a decisive opinion based on Chōtā-Nāgpūr facts alone, especially when such an eminent authority as Dr. J. G. Frazer has on a consideration of Australian facts decided in favour of what he calls the "Conceptional" origin of Totemism. Besides Totemism, which may have originated either from an ignorance of the physiological knowledge of paternity and mistaken notions as to conception, as Dr. Frazer opines, or from the primitive man's recognition of the necessity for alliance with the helpful or harmful powers of the animal, vegetable, and mineral kingdoms around him, as Chōtā-Nāgpūr facts would seem to suggest, or from some other cause, the Orāon's recognition of the need for such alliance finds further

expression in his periodical sacrifices to the beneficent cattle-spirit called *Goensaki bhūt*, and in invocations of tree-spirits residing in the *Karam* tree (*Nauclea parvifolia*), and the *Jitia pipar*-tree (*Ficus religiosa*), and the flower-spirit in the blossoms of the *Sāl* tree (*Shorea robusta*). Such are a few illustrations of the application of the principle of alliance with beneficent powers in the social and religious systems of the Chōtā-Nāgpūr aboriginal.

(II.) *Sympathetic Alliance.*

When we proceed to a consideration of magic and witchcraft on the Chōtā-Nāgpūr Plateau, we come to another aspect of the same principle of alliance.

Instead of entering into regular ceremonial alliance, man may enter into sympathetic relations—or alliance by sympathy—with the powerful forces of the animal, vegetable, and mineral kingdoms, the heavenly bodies, the elements, and so forth, and thereby secure their helpful influence for his benefit. In the lower culture we find alliance by sympathy, through actual contact or through imitation or suggestion, even more extensively resorted to than direct ceremonial alliance. This process of sympathetic magic, in its two branches of imitative or homœopathic magic and contagious magic, will be found to lie at the root of most of the quasi-religious, social, domestic, and other ritual of the aborigines of Chōtā-Nāgpūr, particularly the Orāons. Such alliance may be either temporary or permanent. Alliance by suggestion or imitation is generally temporary; alliance by contact is in some cases temporary and in others permanent. The contact required for sympathetic magic may be either direct or indirect. The contact may be with the whole or part of the beneficent power with which alliance is sought, or it may be with some other object which had at one time been in contact with the beneficent power in question.

In the instances that follow of different kinds of magic, I have referred more to Orāon than to Mūdā practices, because the Orāon is a greater believer in magic than the Mūdā. Where the Mūdā believes that a certain trouble is due to the wrath or malice of some spirit, the Orāon thinks the spirit is merely a tool in the hands of some magician by whom it has been put up to the mischief. So, if a Mūdā gets a sudden attack of headache or griping in the stomach, or pain in the legs, or falls down it a fit of epilepsy, he at once concludes he must have come in collision with some spirit, that he must have trodden some spirit under his feet, or jostled against it while walking or working on his fields or elsewhere. As a means of reconciliation with the offended spirit, he scatters a little powdered turmeric around himself. The Orāon, who suspects magic or witchcraft where the Mūdā scents a spirit, always takes particular steps to ward off the evil eye of witches or the malicious intentions of sorcerers. Such Orāons as know the proper spells, when going out on a journey, take up a handful of dust, mutter the *bandhni* spell over it and scatter the dust all around his own body to fortify it against the evil eye, and the “*bān*,” or spiritual arrow-shot of the magician during the journey or during his stay outside his village.

(a) Imitative Magic.

A notable instance of imitative magic is the Orāon ceremony of rain-making. When rain is badly wanted in any part of the Orāon country, the Orāons of each village fix a day for the rain-making ceremony. On the morning of the appointed day, the Orāon women of the village, with the wife of the village-priest or Pāhān at their head, proceed to the village spring or tank, and there, after ablution, each woman fills her pitcher (*lōtā*) with water, and all proceed in a body to a sacred *pipar*-tree (*Ficus religiosa*). Before these women have had their ablutions and are gone with their *lōtās* filled with water towards the sacred *pipar*-tree, no one else is allowed that morning to touch the water of the tank or spring. On their arrival at the sacred tree, all the women simultaneously pour the water in their pitchers over the foot of the tree, saying, "May rain fall on earth like this." The wife of the village-priest now puts marks of vermilion, diluted in oil, on the trunk of the tree. After this the women depart, and the Pāhān or village-priest proceeds to sacrifice a red cock to the god Bārāndā at the spot. It is firmly believed by the Orāons that within a day or two after this rain-making ceremony, rain is bound to fall. And in olden times, it is said, a heavy shower of rain would even overtake the women on their way home from the sacred tree. In this case, apparently, direct alliance, by sacrifice and by anointing the tree with vermilion, have been super-imposed on what was once, perhaps, purely a ceremony of imitative magic. Such combination of imitative magic with prayer and sacrifice is a prominent feature in the chief religious festival of the Orāons. This festival, known as the *Khaddi* or *Sarhūl*, is celebrated when the *sāl*-flowers are in blossom in the month of April, shortly before the time for sowing paddy in their fields. Seasonable rain and plenty of it is a necessity to the agriculturist. And the Orāon is, above all, an agriculturist. Naturally, therefore, he leaves no expedient untried to ensure plenty of rain. Thus, when on the occasion of the *Sarhūl* festival, the village-priest or Pāhān and his assistant, the Pūjār, go in procession from house to house, the women pour large jarfuls (*gharās*) of water over the head, first of the village-priest, then of his assistant, and finally over the head of anyone and everyone; and all the Orāons revel in water on that day and splash mud on each other so as to present the mud-besmeared appearance of persons sowing paddy-seeds in mud (making *lewā*, as it is called). By this they hope to have plenty of seasonable rain for their agricultural operations.

The further custom observed on the same occasion, of all the Orāon families of a village heaping rice on the sacred winnowing-basket (*sūp*) which the Pāhān carries in procession, and the Pāhān dropping rice from his *sūp* all along the route as he proceeds, and his assistant, the Pūjār, continually dropping water from his *bātāri* or pitcher with a tube attached to it, all along the route, is another instance of imitative magic for securing plenty of rain and crops. As a further instance of imitative magic performed on the occasion of the *Sarhūl* festival I may mention

the custom observed in every Orāon house of putting a live crab into the burning hearth. As the crab crackles in the burning hearth, the women exclaim, "May our lentils and pulses burst their pods like this." Again, as the heat of the fire makes the crab hanging over the hearth stiffen its legs and bring them together so as to present the appearance of a cluster of pods, the women exclaim, "May the pods of our lentils and pulses come out as thick and full as this." When the Orāon cultivator sows his *urid* (*Phaseolus roxburghii*), he mixes with the *urid* seeds a little of the powdered legs of this crab.

If we turn from religious festivals to social ceremonies we find imitative magic as extensively applied. Thus, by a process of imitative magic the yoke of a plough, and three bundles of straw, on which the bride and bridegroom are seated at the *Khiri-tengna* ceremony at an Orāon wedding, are calculated to bring the married pair prosperity in agriculture. Another instance of imitative magic in connection with an Orāon marriage is the practice of keeping apart at the harvest preceding the marriage a few of the best sheaves of paddy, carefully selected by a young bachelor who must be ceremonially clean during the process. These selected sheaves of paddy are used in the benedictory ritual of the marriage, and are calculated to bless the newly-wedded pair with agricultural prosperity—with abundant sheaves of paddy as full and fine as those. A minor instance of such imitative magic is the practice, prevalent in some Orāon villages, of an Orāon woman breaking a small thin reed (*kharika*) into one very small bit and two larger pieces, and throwing these on the open space (*āngan*) before her house, in the belief that this will cause the menstruous flow to cease after two days and a-half.

(b) Divination.

The principle of sympathetic magic appears to be further illustrated by the practice of omen-reading or divination. If an intentional imitation of some desired result produces that result by something like spiritual attraction, an unintentional and accidental imitation, real or fancied, of something fortunate or calamitous—of some human event, or physical phenomenon—may, it is believed, attract such thing, event, or phenomenon by a similar spiritual sympathy. Thus, during the ceremonial ablutions at the village spring or tank where all the Orāon villagers assemble for the purpose on the occasion of the *Sarhūl* festival, if the Pāhān or his assistant, the Pūjār, happen to touch any part of his body with the hand, it is apprehended that fleas and mosquitoes will prove particularly troublesome to the villagers that year.

The cawing of crows is an evil sound which bodes misfortune through sympathetic attraction. So is the sight of a jackal crossing the path of an Orāon or a Mūdā on a journey.

Anything abnormal is an evil power which sympathetically attracts some evil or misfortune. Thus, the birth of a child with one or more teeth portends the

death of either of the parents in a short time. Orāons, it is said, generally put such a baby to death by secretly making it swallow a large quantity of salt. An Orāon girl whose canine teeth grow out of the line, finds it difficult to get a husband, for the girl is fated to be a widow within a short time of her marriage.

If a present event or phenomenon attracts a like event or phenomenon in the near future by sympathy, conversely does a future event or phenomenon sometimes cast its shadow before it in the shape of an analogous event or phenomenon. Thus, at about 2 a.m., on the morning of the *Sarhūl* festival, the village-priest's assistant has to carry to the sacred grove four earthen jars filled to the brim with water from the sacred spring called Sarnādāri. The jars are left there, arranged like a square, till after sun-rise; the village-priest and other village-elders proceed to the sacred grove to read the omen indicated by the water in the jars. If all the jars are full to the brim there is sure to be plenty of rain in all directions for agricultural operations. If one or more of the jars are not so full, it is taken to be an augury that there will be insufficient rain-fall towards the points of the compass indicated by the position of such jar or jars. If the jar on the north is not full to the brim, there will be insufficient rain in the north, and so on.

(c) Contagious Magic.

If in some instances of beneficent imitative magic, as in the case of the rain-making ceremonies, we perceive an attempt at control of, rather than alliance with, the powerful forces of Nature, the principle of alliance is more clearly in evidence in the case of beneficent contagious magic. The Orāon and Mūdā practice of wearing rings and armlets (*bera*) made of iron previously exposed to the influence of an eclipse of the sun, so that the wearer may offer to the "evil eye" of witches, and the evil attention of ghosts and spirits, a resistance as strong as that of iron so hardened, is an instance in point. The person wearing the armlet is believed to acquire the strength of the iron; and the iron itself is believed to have acquired greater virtue through the sympathetic influence of the eclipse. Such rings and armlets are believed to be most effective in averting a thunder-stroke. A more striking instance of beneficent sympathetic magic is the Orāon practice of eating certain things to imbibe their virtues. Thus, an Orāon sometimes eats the eye of a hare to obtain keenness of vision, and the liver of a fox to acquire a musical voice.

The Orāon tradition as to the origin of the power of the snake-charmers and snake-doctors (*Nāg-mātis*) of his country, furnishes us with another instance of a similar contagious magic. The first *Nāg-māti*, it is said, had twenty-two eyes, and was a past-master in his art, who could even restore to life persons bitten to death by snakes. By a strange irony of fate, however, this father of snake-doctors himself met his death by snake-bite. Before he died, he instructed the twenty-two disciples whom he had taken under his tuition, that on his death they should eat

his flesh to acquire the powers he possessed in life. Accordingly, on his death, his disciples cut his corpse to pieces, stewed the flesh and divided it amongst themselves in twenty-two leaf-cups. When the disciples sat down, each with his own leaf-cup of meat, each asked the other to begin eating. Now Dharmes' (the Supreme God), when He saw the twenty-two disciples about to eat the flesh of their deceased master, thought within Himself that if so many men acquired the powers of their late master, there would be no death by snake-bite, and the occupation of the serpent-kind would be gone. To prevent the possibility of such an undesirable state of things, Dharmes' at this juncture approached the disciples of the late snake-doctor in the guise of a venerable old man and inquired of them what they were doing. On being told what they were about, the old man exclaimed with an air of indignation and horror, "Fie! fie! my sons, what a sin you are about to commit!" "No," added he, in a compelling tone of authority, "you must abstain from this unprecedented act of impiety. Go, now, and commit the meat to the burning fire." The disciples of the deceased Nāg-māti, who had already felt a natural disinclination to swallowing this human meat, now thought this old stranger must be right, and proceeded to throw the meat into the fire. One of the men placed his *dōnā* or leaf-cup on his head before consigning its contents to the fire, and a drop of meat-juice trickled down his cheeks and entered the corners of his mouth, and thus this man alone acquired a fraction of the powers that his late teacher had possessed. It is through this more fortunate disciple that the Nāg-mātis of our days have inherited what little knowledge of snake-charming and snake-bite cure they still possess.

A similar story is related of the powers of the present race of witches and sorcerers.

To return from ancient tradition to modern practice. A further curious instance of contagious magic is furnished by the Orāon's belief in the effects of wrestling. If a man, it is believed, engages in wrestling exercises for twenty-one consecutive days with another possessing greater strength than himself, and on the twenty-first day succeeds anyhow in bringing the stronger man to the ground even for a moment, all the strength of his opponent is forthwith transferred to himself, and thenceforth he becomes the stronger of the two. On a somewhat similar principle, Orāon children besmear their own cast milk-teeth with cowdung and saliva, and then throw these teeth on the roof of their own huts. As they thus throw away the teeth, they call on the mice to exchange their milk-white teeth with their own cast milk-teeth, saying, "Nighāi pachchā, enghāi pūnā"—[May] mine [be] new, [and] yours old."

The custom of every passer-by throwing with his feet a stone on certain cairns called *pāthal-pūnjis*, appears to be an instance of ceremonial alliance with the spirit of the cairn to avoid swelling of the legs. Of such cairns, I may mention the one at the border-line between villages Sakra and Prayāgū (*thānā* Māndār), and another on the border-line between villages Dārkanā and Tigūāl (*thānā* Chainpūr). The cloth on the person of a man killed by a tiger, as also the hair or the bone of

a person drowned in a rushing stream, are valued by the Mündā and the Orāon as powerful remedies against certain diseases of men and cattle. In these cases the fierce tiger and the turbulent stream are believed to have imparted their own powerful energy to the cloth, hair, or bone. And perhaps the touch of the mighty hand of Death has added to its efficacy. Death, as a most powerful energy which imparts its power to whatever it comes in contact with, is clearly illustrated by the following instances of contagious magic amongst the Orāons and the Mündās. A fragment of the charred remains of the funeral pyre on which a man dying on a Sunday or a Tuesday has been cremated on the very day of his death, is valued as a powerful charm against many diseases. Such a piece of charcoal is hung on the neck of a sick man with fresh thread which has never come in contact with water or other liquid. But such charm, to be efficacious, must have been brought from the burning-place the very night following the cremation, and the person bringing it must have gone to the cremation place stark naked. Many Orāons do not observe these conditions. To them the charred remains of the wood used in cremation is efficacious under any circumstances, provided the thread with which it is suspended on the patient's neck is fresh from the spinning wheel. Again, a piece of bread baked that very night on the very spot on which such a corpse was burnt is believed to be impregnated with great potency. The house in which such a piece of bread or charcoal is preserved is believed to be immune from a variety of diseases. Similarly, a mushroom growing on the remnant of a log of wood used in burning a corpse is believed to be a powerful remedy for hysteria. Such mushrooms gathered from a burning-place are pounded, and administered to a hysteria-patient along with molasses and a few other substances. There is a popular saying in Chōtā-Nāgpūr, "Jāhā masān tāhā apsan,"—"Where there is a burning-place there is [the remedy for] *apsan* or hysteria."

A sword with which human blood has been shed and death caused, is believed to acquire a most powerful energy through contact with blood and death. In fact, the Orāons and the Mündās say that a powerful spirit "rides" on such a sword. Thenceforth the sword becomes an object of religious awe. It is carefully suspended against the inner wall of the owner's house, and at every festival a few drops of liquor are offered to the sword. It is believed that if the sword is taken out of the house, it will not rest until it has drunk some blood.

Of all blood, it is the sacrificial blood that is believed to possess the greatest potency. A few drops of the blood of an animal or fowl sacrificed to Dharmes or the Supreme Deity, have to be drunk by an Orāon or a Mündā outcast by way of purification when he is re-admitted into the tribe. Such sacrificial blood has also to be drunk by a man returned from jail, before he can be admitted even into his own house. The evil influences of contact with strangers during his stay in the jail are thus removed by the stronger power of the sacrificial blood. If, however, the theory of the original totemistic identification of the sacrificial animal with the totem-spirit be correct, such drinking of sacrificial blood may be regarded as a renewal of tribal kinship.

Water and fire, are, like sacrificial blood, beneficent powers, with the aid of which the mischievous influences of many an evil power may be neutralized. Thus, people who have touched a corpse get rid of the evil influences of such contact, first by bathing in the water of a spring, well, tank, or stream, and then by the following process of fire-lustration or rather fumigation : a few handfuls of husks and broken grains of rice are placed on the ground, and over them a few pieces of burning charcoal ; a little oil poured over it makes the husks quickly take fire, and over the wreaths of smoke thus produced, the persons contaminated by the touch of a corpse hold portions of their garments by way of purification. Again, after the annual *hārbōrā* or bone-burial ceremony in the month of *Pūs* (December-January), when the bones of all deceased persons of an Orāon village who died during the preceding year are ceremonially buried in the family burial place, the village-priest or Pāhān has to purify each individual Orāon, by sprinkling water on such person with a few blades of a long grass known as *phūrchirā*. The Pāhān has on this occasion to perform a ceremony known as "village-purification" or "*paddā-kāmna*." The principal feature of this ceremony is the ceremonial procession, in which the Pāhān, at the head of the whole body of villagers, traverses the village from one end of it to the other and ceremonially sprinkles water from a pumpkin-gourd on every suspicious-looking nook and corner and every bend and turn on his way. Between the bone-burial ceremony and this "village-purification," no person in the village may undertake a journey, nor may a wedding or other auspicious ceremony take place in the village. There is a suggestive resemblance between this death-tabu on the village-community, and a somewhat similar tabu observed in every Hindu family for a period of one year from the death of its master or mistress.

Water-lustration is employed by the aboriginals of Chōtā-Nāgpūr on various other occasions besides death. Thus, purification by ablutions in cold water is required in the case of women who have attended a delivery, in the case of a priest or other person who has to offer sacrifices or make other offerings to a deity or spirit, and in the case of a bride and a bridegroom just before the actual wedding ceremony. Such ablutions are believed to remove all supernatural evil influences. Even the ceremonies of washing the feet of guests just arrived, and of members of the family on their return home from a distant place, though these may appear to us as only delightful exhibitions of Orāon and Mündā hospitality and domestic affection, may not improbably have originated in the supposed efficacy of water in removing all possible supernatural evil influences of strange places and strange roads.

Water under certain circumstances acquires more than ordinary energy or soul-power. Thus, rain-water collecting in old hollow trees is a beneficent power which cures fever that has baffled the art of the medicine-man. An Orāon fever-patient goes to such a tree with a handful of rice, a pinch of red-lead, a few yards of thread, and a small new earthen pitcher (*chūka*). Arrived at the tree, the patient puts with his own fingers three vermilion-marks on the tree, sprinkles a handful of rice on it, and ties the thread in three folds round the trunk of the tree.

Finally he bathes in water taken in his earthen pitcher from the hole of the tree. After this the man is expected to get well in a short time. Here, again, we come to direct alliance with the energy or spirit of the water, or rather of the tree. The red-lead mark is probably the reminiscence of a blood-covenant, and the tying of thread round the tree is evidently meant to symbolize the bond of friendship thus formed. It may be noted that in this case the power belongs to the hollow tree rather than to the water. For, among the Mündās and the Orāons, any weed or other plant growing on such a cleft tree is used as a medicine for various diseases. The unusual appearance of the tree invests it with such power in the minds of these people.

On various occasions Orāon and Mündā women are required to renew their alliance with the village spring, well, or tank from which they ordinarily draw water for drinking and cooking purposes. Thus, a few days after child-birth, the new mother has to put three vermilion-marks with her fingers on the stone slab standing by the side of such spring, well, or tank. This ceremony apparently symbolizes the renewal of the woman's alliance with the spring, well, or tank, after the critical period of delivery and the perils of the blood connected with it have been tided over. Here, again, we come to the principle of Direct Alliance. On the same principle a newly-married girl on her first arrival at her husband's village, has similarly to put three marks of vermilion on the stone slab attached to the village spring, well, or tank, the very first time she goes to draw water from it. If the new mother or the new wife draws water from such a spring, well, or tank, before such ceremonial renewal of her alliance with the spirit of the water, either maggots will breed in the water or the water will otherwise get polluted. Such unclean water is at once baled out, and the village-priest, on behalf of the village-community, renews their alliance with the spring, tank, or well by ceremonially putting vermilion-marks on the stone slab by its side. Such are a few illustrations of the application of the principle of alliance, both direct and sympathetic, in the magico-religious system of the Orāons and the Mündās of Chōtā-Nāgpur.

THE PRINCIPLE OF AVOIDANCE.

As good powers help either through actual alliance, or through contact or imitation, so do evil powers harm, either through contact or through the long-range influence of sympathy. The contact necessary to produce harm may be either direct or indirect, it may be either with the person or other thing sought to be harmed, or it may be with something which has or had any real or supposed connexion with that person or thing.

(I.) *Direct Contact.*

As instances of harm through direct contact with evil powers, I may mention the following Orāon and Mündā superstitions. As a snake is an evil power, people wearing necklaces made of snake-bones (*ner khochol poon*), as well as Nāg-mātis or snake-doctors whose business is to handle snakes, become through contagious

magic, themselves evil powers. Necessarily, therefore, seed sown by such people will either not germinate at all, or, at any rate, yield an unsatisfactory return.

Some roots and other vegetable compounds are believed to possess power to attract, and others to repel, men, beasts, and birds through contact. These substances are brought into contact with a girl's clothes to make her love someone or hate someone, as may be desired. It is said that if you touch a dog with this love-charm, and forthwith conceal yourself, the dog will trace you out wherever you may go; and similarly, if you once touch a dog with the hate-charm, the dog will run away from you however much you may seek to approach it.

Witches and sorcerers often harm through direct contact. Thus, they generally have with them small rag bundles in which they carry small thin knives and nail-parers, besides nails, bones, and legs of chickens and other birds and animals, as also small quantities of rice, *urid* pulse, mustard-seeds, oil-seeds, and some other grains. These are known as *nāsāns* or mischief-making agencies. A witch or sorcerer desiring to cause harm to a person, manages unobserved to mix with such person's food a small piece of a leg or bone, or some nail-parings from his *nāsān* bundle, over which spells have been pronounced. This bit of nail, or bone, or leg, is believed to grow gradually inside the person's stomach, and finally kill him, unless another magician is called in to counteract the power of the *nāsān*. A magician, thus called in, stands face to face before the patient so that the mouth and navel of the sorcerer respectively touch those of the patient; and in this posture he goes on reciting his *mantrams* or spells until the bone, leg, or nail-paring comes out of the mouth of the patient into his own mouth.

The *tikli* and the *singhi* which are employed by a sorcerer to transfer evil spirits from the flame of his own magic-lamp, or from the body of a possessed individual to someone else, further illustrate the method of harming by direct contact. The *tikli* is a very small, thin, circular bit of silver or copper. When a *māti* or ghost-doctor is engaged in exorcising a spirit, he heats this *tikli* over burning frankincense, fixes it on a copper coin, and places the copper coin with the *tikli* on it in front of the patient. When the evil spirit is exorcised, it is transferred to this *tikli*, or, as the Orāon would say, it is given the *tikli* for its seat. The *tikli*, thus charged with an evil power, is then secretly carried by the *māti* to some market, or fair, or *jātrā*, where crowds of people assemble. There he throws it unobserved on the garments of some unmarried girl. The *māti* slinks away from the place as quickly as he can for fear of detection. The girl on whose clothes the *tikli* sticks is sure before long to be possessed by the evil spirit in the *tikli*. Sometimes such a *tikli* laden with a disease-spirit is attached to the wings of a pigeon or other bird belonging to an enemy. The bird carries the evil spirit to the house of the enemy, and some member of the family falls dangerously ill. The *tikli* affixed to a pice or other copper coin is sometimes left on a public road, so that the spirit may harm the person who takes up the coin. Sometimes when an Orāon or a Mūdā seeks the help of a *māti* or sorcerer to wreak his vengeance on an enemy, the *māti* gives his client a *singhi*, or small tapering iron tube, in which is confined

either an evil spirit from the flame of his own magic-lamp, or an evil spirit exorcised from the person of one obsessed. The client secretly carries the *singhi* at night to his enemy's house, and pins it down into the wall, plinth, or some other part of the house. Sickness and other troubles are believed to follow this operation.

Contact with a witch's soul moving about at night is productive of the greatest misfortune. Whereas the soul of an ordinary human being leaves the body automatically in sleep, trance, or death, and wanders about like the wind, not as he chooses but as other forces determine, the soul of the wizard or witch can assume a material form, leave the body at will, and go wherever it chooses. It is, however, the night-time that the wizard and the witch choose for their excursions out of the body, and the material shape their souls generally assume is either that of a black cat or that of a human pigmy no higher than the height of the thumb of a man. Such a cat or pigmy is called a *chōr-deva*, or thievish spirit, by the Chōtā-Nāgpūr aboriginal. The favourite *modus operandi* of the cat-shaped *chōr-deva* is to enter a bachelor's dormitory in an Orāon village at the dead of night, and either lick up the saliva trickling down the corners of the mouth of a sleeping person, or nibble at the dead skin on the soles of a person's feet, or bite off a portion of the hair of a sleeping woman. Not long afterwards the person concerned falls ill, and sometimes the illness caused by the magic touch of the *chōr-deva* proves fatal. But in case such a *chōr-deva* is caught in the act, it is paid back in its own coin, for the injury inflicted on the cat-shaped soul or *chōr-deva* hurts its physical body, lying at home, and if the cat is killed or wounded the body of the wizard or witch lies dead or similarly wounded at home. Many an instance of such an occurrence has been related to me with circumstantial details by Orāons and Mündās who obviously believed in what they said. Thus does contagious magic, which is the favourite weapon of the wizard, recoil on his own head. The procedure adopted by the wizard or witch when it is intended to cause harm to a man's property is different. In such a case the *chōr-deva* assumes the form of a pigmy no bigger than a man's thumb, and carries a small carrying-pole made of the twig of a castor-oil (*erndi*) plant, with two carrying-nets made of human hair suspended at its two ends. On each carrying-net is placed a diminutive basket in which the witch carries away grain from people's granaries. From the moment a witch thus touches a man's granary, even though the grain stolen be but a mere handful, prosperity bids farewell to the owner of the stolen grain, his granary is soon exhausted, and even his fields cease to yield their wonted harvest. Such is the powerful sympathetic magic of the touch of the witch's hand. Such instances take us from direct to indirect contact.

(II.) *Indirect Contact.*

We have seen how through contact with their spittle or hair or dead scarf-skin, men are injured in health by a witch or sorcerer. Among instances of harm caused through more indirect contact may be mentioned the contagious magic of the dust of a man's feet, his blood, and his urine.

The Orāons and the Mūdās believe that some evil spirits are always on the look-out for a drop of the blood or urine of a pregnant woman, and that when such blood or urine is found and licked up by an evil spirit, the woman is sure to have difficult labour, which may end in death. As for blood, not only a woman but also a man, promptly effaces with the feet or covers with dust any blood that may fall from any part of the body; for it is believed that if a witch licks up such blood or a spirit overshadows it, or ants or some particular species of birds lick it up, the person whose blood is licked up is sure to fall sick. Blood falling on the ground at midnight is particularly dangerous, as at that time evil spirits roam about in all directions. Sometimes a witch or sorcerer wishing to harm a man secures a little dust of his footprints and effects his mischievous purpose by uttering some magic spell over such dust.

A witch or sorcerer can, however, harm a man even without the instrumentality of any such tangible thing. By the mere uttering of a man's name and pronouncing some suitable spell or incantation over the name, a magician is able to effect his mischievous purpose.

To the Orāon and the Mūdā, as to most people of the lower culture, a name is an integral part of its owner and consequently offers a suitable handle to the sorcerer for his magical operations. This supposed intimate connection of a name with its owner explains the reason why the Orāon and the Mūdā avoid naming certain persons and certain places at certain hours. Thus, after night-fall, any Orāon or a Mūdā will not use the words "serpent" or "tiger," but describe a "serpent" as a "cord" (*rassi*) and a "tiger" as "the long-tailed thing" (*lām-pōchhia*). Should the actual names be used, their owners—the serpent and the tiger—would, it is believed, be attracted to the place. Again, in the morning, an Orāon avoids naming certain persons or certain villages—sometimes all villages except his own—for fear of ill-luck following the uttering of such names. The chance of ill-luck may, however, be avoided if he utters the magic words "*lūpūng lūpūngā*" before he pronounces those inauspicious names. It is probably to prevent magicians from easily finding out the real name of a person, that the Orāon parents give two names to each child. One is the name given to a baby at birth, and known as the *janam nām* or birth name, and the other the real name called the *bichehal nām* or name selected by some supposed supernatural process.¹ The *janam nām* is selected according to the day or the week or the month of the year in which a person is born. As, for example, a baby born on a Monday is called Somra or Sumri, according as it is a male or a female child; and a baby born in the month of Aghān may be called Aghnū or Aghnī, according to its sex. There is reason to believe that the *bichehal nām* or real name was formerly known only to near relatives and friends, but, nowadays, the birth name or *janam nām* is very often dropped when the *bichehal nām* is selected, and an Orāon is known to relatives as also to outsiders by the real name.

¹ Compare the *rāshi nām* and the *dāk nām* of Bengali Hindus.

A remarkable instance of contagious magic is the Orāon belief in the powers of the *chhāin* or shadow. The soul or spirit of a man is indeed sometimes identified with his shadow; and a man of strong individuality is said to have a *iabar chhāin* or "powerful shadow," and a weak or nervous person to have a *hālūk chhāin* or light shadow. The shadow of a man of the former type falling even on a venomous snake is believed to be able to hold the snake spell-bound at the spot and make it unable to budge an inch. An evil spirit often harms a person, particularly a child, by what Orāons and Mūdās call "*chhai-ānā*" or over-shadowing it.

As a further instance of contagious magic I may mention what is known in Chōtā-Nāgpūr as *langhan*. When an Orāon gets a pain and swelling in his legs, he ordinarily attributes it to his having crossed either some stray evil spirit (*bhūlā*), or some mustard or other things impregnated with the force of some powerful spell pronounced over it by a sorcerer. Again, if he happens to walk across a person suffering from such pain, he becomes liable to a similar attack. Similarly if he happens to walk across a leaf-cup (*dōnā*) or leaf-plate (*pātrī*) from which some other person, particularly a stranger or a man of another caste or tribe, has eaten or drunk anything, he runs the risk of contracting pain in his throat. The evil power with which all strangers and aliens are credited, has through contagious magic passed on to the remnant of his food or drink, or to the plate or cup from which the food or drink was taken, and is again transferred by sympathetic magic to the throat of the person crossing it. The idea of pollution by contact with the leavings of other people's food now widely prevalent all over India, may not improbably have its roots deep down in such primitive fear of contact with evil powers, and may have been borrowed by the so-called Aryan Hindu from the animistic aboriginal. Subsequently indeed the ideas of physical cleanliness, hygienic necessity, and even internal purity, have been super-added so as to transform the original idea beyond recognition, but it is amongst such animistic tribes as the Mūdās and the Orāons of Chōtā-Nāgpūr that we meet with the beginnings of the idea of *chhūtkā* or *touch-tabu* in its original naked simplicity.

(III.) *Long-range Influence of Evil Powers.*

To retrace our steps, then, and go back to the sorcerer and the witch of Chōtā-Nāgpūr. We have seen that these magicians sometimes seek either direct or sympathetic contact with their intended victims in order to effect their mischievous purpose. But the evil touch is not more effective than the evil eye. The evil eye of witches who are particularly averse to the sight of the gaudy dress or ornaments of others, make the well-dressed Orāon beau or belle dancing at the village *ākhrā*, or dancing ground, sometimes fall down in fainting fits. At times more serious consequences flow from the evil eye of a witch. A drop of blood mysteriously appears on the gala dress of a young man or woman, and serious illness overtakes the person in a short time. Food, like dress, is a favourite target for the evil eye. Orāon women are particularly anxious about the rice-flour they prepare on some

festive occasions to make bread with. If the rice-flour happens to attract the evil eye of a witch, or the "shadow" (*chhāin*) of a ghost, the bread prepared out of it will either be imperfectly baked, or emit a foul smell, or cause diarrhœa or other sickness to those who partake of such bread. Similarly the evil eye of a witch or sorcerer directed against food or drink is believed to poison it. It is, however, not witches and sorcerers, alone, that possess the "evil eye." Anyone may possess it by nature. The glance of some people has naturally a mischievous potency in it which causes harm to other people's food, drink, cattle, and crops. A curious instance of the power believed to reside in the human eye is the following custom in vogue amongst the Orāons.

When two women of the same Orāon village give birth to children in the same half of the moon, they are not allowed to see each other for the first twenty days after delivery. On the twenty-first day, the two women are led blind-folded from opposite directions to a spot fixed beforehand, and then the coverings over the eyes of the two women are taken off simultaneously. It is believed that if the cloth over the eyes of one of the women is taken off before that over the eyes of the other, the glance of the former will forthwith attract to her own breasts all the milk in the breasts of the other woman, so that the child of the latter will pine to death for want of mother's milk. If ever the eyes of either of the women are by chance uncovered in this way before those of the other, the two families fall out at once. The help of sorcerers and witches is secured by each family to harm the other; and thenceforth no love is lost between the two families.

It is, however, not human eyes alone that may possess such evil power. The eyes of some animals and reptiles, too, are credited with the same mischievous energy. Thus the Dhōra snake—a huge snake with black and white stripes on its skin—is believed to have a particularly "evil eye" which is able to cause disease and death through its glances. The sight of this serpent in the month of Asārḥ (June and July) is particularly dreaded. Whenever an Orāon meets such a snake, he forthwith goes home, takes a handful of paddy or urid-pulse and fries it with his own hands, so that the "evil eye," or rather its poison, may by sympathetic magic burst as these grains do on the frying pan. This fried grain is not eaten by any adult man or woman, but is distributed among the children.

If the evil touch (*chhūt*) and the evil eye (*najar*) are powerful in working mischief, most potent of all mischievous agencies is the evil sound, the word of power, the evil-working *mantram* or spell. Unlike the evil eye and the evil touch, the evil sound or *mantram* may be aimed at the intended victim from any distance in space and without the least chance of detection. It is called the *bān* or arrow-shot of the witch and the sorcerer. The Orāons believe that with the help of a powerful *mantram*, a magician is even able to extract unperceived the liver of an intended victim, wherever the victim may be. The liver is, as we have already noticed, regarded as the seat of the vital principle. The extracted liver is carefully preserved and watched by the magician for the following

twenty-four hours. If in the meanwhile the man whose liver has been thus extracted calls in the aid of another magician, and if such magician by means of counter-spells succeeds in keeping the ants from touching the extracted liver within the said period of twenty-four hours, the liver at the end of that period has to be restored to its owner, in which case the latter gets well again. If, however, ants succeed in eating at the liver within twenty-four hours from the moment it has been taken out, the patient gets worse and worse, and finally the witch or the sorcerer eats up the liver and the patient forthwith dies.

(IV.) *Modes of Avoidance.*

The different methods by which protection against the various Evil Powers is sought by the aboriginals of Chōtā-Nāgpūr are: (1) *tabu*, or simple avoidance; (2) avoidance by diversion; (3) avoidance by threats or by mimetic repulsion; and (4) avoidance by actual expulsion through the help of beneficent powers.

(1) Simple avoidance, or *tabu*.

Tabu, or negative magic, furnishes us with numerous illustrations of the principle of simple avoidance. The best way to safety is to keep yourself out of harm's way—to avoid contact, direct or indirect, with the harmful powers. Such an idea appears to lie at the root of the various *tabus*, or prohibitions which men of the lower culture impose on themselves—*tabus* in connection with names, birth, death, sex, food, blood, and a number of other things.

We have already referred to certain *tabus*, such as name-*tabus*, observed by the Orāons and the Mūdās of Chōtā-Nāgpūr. The idea of the perils and powers of blood appears to have given rise to the prohibition against contact with a woman at child-birth and for a few days after it. By sympathetic magic things used by her—the furniture, utensils, and other things in the lying-in room, and, in fact, the house itself—are under a temporary *tabu* to persons not belonging to the family. The reason for the supposed ceremonial uncleanness of persons who have touched a corpse, or taken part in a funeral ceremony, is apparently the supposed contact with the disembodied spirits of the dead. It is believed that when a person dies, the spirits of his pre-deceased kinsmen crowd round the death-bed, in order to take him to their abode in the underworld.

The sexual act is a mysterious power, and is consequently tabued during and immediately before such auspicious occasions as a religious festival, the first sowing of one's rice-field, and a hunting expedition. It may be noted that amongst the Mūdās and the Orāons, whereas in most religious ceremonies it is the sacrificer alone, and in sowing it is only the man actually scattering the seeds, on whom continence is obligatory, in the case of a hunting expedition not only the men who have gone out to hunt but also all the stay-at-home members, male and female, of their families have to observe the sex-*tabu*. A further *tabu* they have to observe is that no animal or fowl must be killed in the village, nor any fish or flesh eaten in

the village by a Mündā or an Orāon, so long as the party of hunters does not return home. An infringement of these *tabus* on sex, food, and killing, is calculated to prevent success in the chase.

Some interesting illustrations of the Orāon's idea of *tabu* are furnished by certain observances in connection with their principal religious festival—the *Sarhūl*. Although the actual *pūjā* or sacrificial feast takes place on one day alone, the festivities and subsidiary ceremonies extend over about a week. All that time, no one in the village is permitted to engage in any agricultural work, or to dig the earth, climb a tree, pluck fruits, or gather edible roots and leaves. The reason the people assign for this *tabu* is, to use their own language, “now that the duties are up, anyone doing such a thing is sure to sustain some injury or meet with some mishap.”

Again, actual contact with a person in whose village the *sarhūl* has been celebrated is *tabu* to the Orāons and the Mündās of a village in which it has not been celebrated—such a person is not allowed to enter the houses, or draw water from or even touch the wells or springs of the village of the latter. If accidentally such a person touches the spring or well of the village, its water will have to be baled out before it can be used by the villagers, and if he has touched any article of food or drink, or even such articles as tobacco or lime, these articles get contaminated through his touch and have to be thrown away. Even if a married daughter in whose husband's family the *sarhūl* festival has been celebrated, happens to visit her father's village before the *sarhūl* has been celebrated there, she is not allowed admittance into her father's house, but is treated like a person of a different caste, accommodated in the outer veranda of a hut, and there someone serves her with food and drink without touching her; and the mats and utensils that may be used by her are not taken inside the house until the *sarhūl* festival is celebrated in the village. Ordinarily, therefore, an Orāon or a Mündā who has not yet had the *sarhūl* celebrated in his village, avoids going to a village where it has already been celebrated. Even if urgent necessity takes him to such a village, he leaves it as quickly as he can, and rigidly avoids touching any food or drink from that village, or even sitting on the same mat with the people of that village. Any accidental contact is believed to entail such serious consequences as the failure of crops in his village where the *sarhūl* has not been celebrated. It is no pollution to people of the latter village to touch any person or thing belonging to a village where the *sarhūl* has yet to come. The reason why persons and things belonging to a village where the *sarhūl pūjā* has been celebrated is avoided by persons where it has not, appears to be the idea that through the renewal of their alliance with the village-deities and other spirits, including the Spirit of Vegetation represented by the sal-flowers, the people of the former village have been invested with a mysterious spiritual energy which may harm the people or the things of another village where the people have not yet similarly associated themselves with those spiritual agencies.

Again, in some Orāon villages, a married woman during her visits to her father's place is not allowed entrance into the cattle-shed of her father. The

reason for this seems to be the fear of harm to the cattle through some spirit of her husband's village, which may have accompanied her.

As an instance of the *tabu* on number, I may mention the Orāon custom of three, five, or seven women coming out to wash the feet of guests at their arrival at a house on a ceremonial business, such as settling a marriage contract. If an even number of women happen to come out of the house for the purpose, it is considered a bad omen.

As regards food-tabu, cooked food touched by a person not belonging to his tribe is *tabu* to a married Orāon. The origin of this *tabu* is obviously the fear of evil powers connected with alien people. To a similar fear of strange gods or spirits is to be attributed the fact that meat of animals and fowls offered to the sept-spirits of any one Orāon sept, is *tabu* to people of other septs; for although such spirits are helpful to members of the particular sept concerned they may be harmful to people of other septs. That is again the reason why a married woman, who necessarily belongs to a sept other than her husband's, may not partake of the meat of the fowls and animals sacrificed at the sacred grove of her husband's village in honour of the gods and spirits of that village. Another circumstance that may probably be partly responsible for the exclusion of women from participation in the *pūjās* or sacrificial feasts in honour of genuine Mūndā and Orāon village deities, appears to be the frequent occurrence of spirit obsession amongst women, which, together with the periodical occurrence of the menstruous flow, appears to have led to the belief that women are by nature deficient in *mānā* or spiritual energy, and, consequently, it is not safe for them to have dealings with the spirit-world.

(2) Avoidance by Diversion.

A second method of avoiding evil powers is to divert their attention.

Thus, to divert the "evil eye" of spirits or sorcerers and witches, and of malicious persons, the Orāon cultivator plants in the middle of his standing upland crops a wooden pole, over which is placed upside down an earthen vessel with its upturned bottom painted black and white. The magic of the colour diverts the "evil eye" from the crops. Again, some of the amulets worn by Orāon children are meant to divert the attention of an evil spirit or of malicious persons, witches and sorcerers: such are the *cowrie* shells worn on the neck or waist of a child.

(3) Avoidance by Threat, or Mimetic Repulsion.

Another method of avoiding evil powers is to make a mimicry of driving them away, not so much by physical terrorism as by the cumulative spiritual force of a body of persons acting ceremonially. A most interesting instance of this is the periodical devil-driving ceremony amongst the Orāons and the Mūndās of the Chôtā-Nāgpūr plateau. Once in the year, in obedience to information sent from one village to another throughout the plateau, each village fixes its date for this

ceremony of driving away the evil spirits that cause cattle-disease. At about midnight of the date so appointed, all the young bachelors of the village assemble at the village *akhrā* or dancing ground. Bachelors, who are supposed not to have any carnal knowledge, are, it may be noted, believed to possess greater soul-power than married men. And that is why they are thus able to put disease-spirits to flight. At the *ākhrā* the *pāhān*, or village priest, hands over to them a chicken and a few annas of drink-money. The village *Ahīr* or cattle-herd, too, comes there with a *tharki* or wooden cow-bell. The *Ahīr* and the young men all now strip themselves naked, and the *Ahīr* with his cow-bell hanging from the back of his waist, and the young Orāons and Mūdās each with a stick in his hand, proceed towards the boundary of an adjoining village. The *Ahīr* runs ahead and the rest of the party run behind him as if chasing him. As the young men run on, they go on uttering shouts of "*Hāmbā-hāmbā*" in imitation of cows, clapping their hands, and breaking to pieces with their sticks all the earthen pots, one or two of which every family has taken care to leave in front of their house. All the time everyone else in the village must keep absolutely quiet, and as far as possible remain indoors. Should any person be heard talking, or even laughing, these young men would belabour such a person with their sticks, and the latter would have to submit to the flogging without protest.

As soon as the *Ahīr* reaches the limits of the adjoining village, he silently drops his cow-bell and quickly retires. The young men then enter a few steps into the limits of the other village, and the fowl, on which marks of oil and vermilion (*sindūr*) are now put, and all the clubs, are left there, and the party return to their village, bathe in some tank or stream, and then put on their clothes, drink liquor, and return home. The village to which the disease-spirit is thus driven, in its turn, performs the same ceremony, and transfers the spirits to the next village, and so on. To drive away disease-spirits that affect human beings, a different ceremony is gone through. Once every year, early in the month of Māgh (January), on a day appointed beforehand, the women of each Mūdā or Orāon family cleanse the floors and courtyard of their house with cow-dung and water, and then sweep the ground with their old brooms. This is done early in the morning. Then the women of each family take up on the lower half of a broken earthen vessel the sweepings, the earthen receptacle in which the cow-dung diluted in water is kept, the old rag which is used as a brush to rub the ground with diluted cow-dung, and the old broom with which the floors and courtyard have been just swept. With these they all go in a body to the boundary of an adjoining village and there deposit the broken earthen vessels containing the sweepings, old rags and brooms, saying "*Eka tarti barchke atram kalae, kirra bar anke*," "Go to the direction from which you came; don't return to our village." But in reality the disease-spirit is sent to the direction opposite to that from which it came. If the sweepings, etc., have been left in the limits of one village by the women of the village adjoining it on the west, then the women of the former village will leave the sweepings of their houses in the limits of the village adjoining theirs on

the east. Again, when there is actually an epidemic in the Orāon country, the people of a village take a goat or a fowl to the limits of the next village. Arrived there the feet of the fowl or goat are washed, a handful of *arua* rice is put down on the ground for it to eat, the forehead of the fowl or the horns of the goat are besmeared with rice-flour diluted in water, and over it is put a mark of vermilion diluted in a few drops of oil. The fowl or goat is left there with an admonition not to return to the village: “Kālāe, ennā bidā nānālāgdanennāntim amke kīrrā. Atram bedke mokhke.” “Go, I am bidding you farewell. Henceforth don’t come back. Search (for your victims) in that direction and eat (what you get there).”

In cases like these the fowl or goat is supposed to be charged with the spirit of the disease.

There is another curious ceremony also known as *Rāg Khednā*, or disease driving, in vogue among the Orāons of Chōtā-Nāgpūr. A rumour is set afloat, generally in the winter months after the harvest, that in some distant village a woman has given birth to a baby-horse or a baby-giant (*rāksas chōā*), or some other monstrosity. Then a number of women (usually one from each family) leave their village one morning and go to as many villages lying in one direction of their village as far as they can walk by noon that day. In every village they go they beg rice, pulse, vegetables, etc., from house to house. By noon they cook the things thus collected, eat them and then return to their own village. A party of women of the next village then follow the example thus set. In this way the evil spirit that has produced such an imagined monstrosity is supposed to be driven away from the country.

Another ceremony of mimetic repulsion of evil powers is the flea-driving ceremony performed by Orāon young men in the month of Sohōrai or Kārtik (September–October). A number of young men strip off their clothes, cover over their body with straw from head to foot, and stick flowers all over the straw covering and go from house to house in the village shouting “Maśā danśā, jā jā,” “Gnats and fleas, away, away.” They get small doles of rice, pulse and vegetables from the girls of the different houses. With these alms they finally go to some open space outside the village *basti*, and there boil the rice and cook the vegetables and pulse thus obtained, and enjoy a hearty meal.

A further instance of the magic of imitative repulsion is the following: When a *bāghout*, or the mischievous ghost of a person killed by a tiger, is supposed to haunt its old home, a man belonging to a different family is made to assume the shape of a tiger. He is provided with a tail and his limbs are painted to resemble the striped appearance of an actual tiger. Thus disguised, he is made to walk on all fours like a quadruped, and is led by two men with strings tied to his hands and legs. As he is thus led forward, the *māti* goes on reciting his *mantrams* and makes a show of chasing away this sham tiger. While this counterfeit tiger is being thus driven away, the *bāghout* spirit is believed to take its flight.

A minor instance of mimetic magic is the following: When an Orāon or a

Mūndā has to pass through a village in which some epidemic is raging, he places on the road a twig of some thorny plant, and puts a piece of stone over it in order that the disease-spirit may lie there similarly pressed down and unable to pursue him. The object of the thorn may also be to prick the feet of the spirit.

A clearer instance of mimetic magic is what the Orāons call the *neochhana* rite. When a child is sick, and the sickness is believed to have been caused by the "evil eye," the mother or some other near relative of the child takes up a few mustard seeds and three peppers in her right hand, waves the hand round the head of the sick child, and then, in a broken bit of an earthen-vessel, puts the mustard seeds and peppers on the hearth. As the mustard seeds crackle over the fire, the woman exclaims, "May the evil eye which has caused the harm burst like these mustard seeds!"

The last instance of mimetic magic that I shall refer to is known as the *Dāndā Kāttā* or *Bhelwā-phāri* ceremony, observed particularly by the Orāons at every important agricultural operation and every important socio-religious festival. An important part of the ceremony is the splitting up the end of a *bhelwā* twig (*Semicarpus anacardium*) and the breaking up of an egg of a fowl into two, so that the "teeth and the mouth," as the Orāons say, of the evil powers may be deprived of their venom—that their teeth may be broken as the egg has been broken and their mouth may be rent asunder as the end of the *bhelwā* twig has been split.

As an instance of avoidance by threat, may be mentioned the custom by which the father of an Orāon bride puts a small iron spear with a handle made of the *chār* plant, into the hands of his daughter before she starts for her husband's house. She carries the spear in her hands during the journey to protect herself from evil spirits on the way. On reaching her husband's house, she inserts the spear into the roof of the house as a threat to such spirits of her father's village as may have shadowed her. Here, again, we may probably trace a survival of the same custom in the practice of putting a knife (which is a sword in miniature), and a miniature shield, into the hands of a Hindu bridegroom when he starts in marriage-procession for his would-be father-in-law's place, and of putting a knife into the hands of a Hindu bride when she is taken to her husband's house.

(4) Avoidance or Exorcism of Evil Powers with the Aid of Beneficent Powers.

Of avoidance of evil powers through the help of beneficent powers, I have already cited a few instances. Such are the use of the magic armlet made of iron hardened through exposure during a solar eclipse, and the cinders of logs of wood used in burning a corpse.

Here is another typical instance. To avert mischief to his paddy crops through the evil eye or through evil spirits, the Orāon cultivator plants twigs of either the *bhelwā* (*Semicarpus anacardium*) or the *pial* (*Buchania latifolia*) trees on each of his paddy fields on the morning of the *Karam* festival in the month of *Bhādo* (August–September). To these twigs is fastened, enclosed in a leaf, a

handful of rice-offering made at the *Bhelwa-phāri* ceremony. In some villages a handful of such rice is buried in one of the fields. This rice is evidently intended to give fertility to the fields.

The aid of the *mantram*, or the word of power, is also sought to avoid mischief through evil powers. Thus, when an Orāon starts on a journey, he sometimes takes a little dust in the palm of his hand, pronounces over it a *mantram* called the *bāndhni*, blows with his mouth over this dust, and finally scatters the dust all round his body. This is believed to protect him against the evil eye of sorcerers and witches and the evil attentions of mischievous spirits. Again, when an Orāon is afraid of the evil designs against himself of some witch or sorcerer, he fortifies his house not by any bulwark of earth or stone, but by the *bāndhni mantram* in the same way. But in these transition times, it is not many Orāons and Mündās who know these *mantrams* or can use them properly.

When the attempt at avoidance fails, and evil powers actually cause harm to an Orāon or a Mündā, he seeks the aid of some beneficent power to remedy the harm and to deliver him from the power of the spirit that has caused the harm.

We have already seen instances of water, fire, and the sacrificial blood being employed as means of lustration. Amulets are extensively used as a protection against evil powers. Thus, a small perforated stone, called *rāti-jara*, is worn on the neck to cure fever brought on by the evil eye of some witch or sorcerer. Before it is worn, its virtues are sometimes augmented by placing it for a few minutes on the ground and putting molasses and burning-charcoal over it.

The aid of the *mantram*, or word of power, is invoked not only to forestall but also to exorcise evil powers. In cases of such sickness as fever and rheumatism, the *māti*, or spirit-doctor, takes a peacock's feather or a broom made of the *sohorai* grass, and with this feather or broom makes gentle passes over the patient's limbs and goes on reciting his *mantrams*. These *mantrams* are generally in the dialect known as Gāwārī or Chōtā-Nāgpūri Hindi; but some of them are in a jargon made up of Gāwārī and Orāon words. They may be described as a curious combination of suggestion, abjuration, coaxing, and threat.

These *mantrams* reveal in the clearest light the Chōtā-Nāgpūr aboriginal's idea of a spirit. We shall describe briefly how exorcism is performed in the case of a female patient whose children all died very young—of course, under the evil influence of some mischievous spirit. The process of exorcism in such a case consists of several distinct stages. The first stage is known as *sumirānā*, or the invocation of helpful spirits to expel the evil spirit concerned. Every good spirit, indigenous or foreign, that the *māti* can think of—even spirits of various places and of powerful ancient kings and sorcerers—are summoned to his aid. Among such names one finds the Hindu god, Mahādeo; the Hindu epic-heroes, Rām and Lachman, the “Kālikātā Kālī-māi,” or the famous goddess of Kālighat (near Calcutta), “Dhantar guru”—apparently the Chōtā-Nāgpūri's name for Dhannantari; the father of Hindu medicine, Basia tānr Rājā—apparently some ancestor of the Mahārājā of Chōtā-Nāgpūr; and Perōā-Ghāg—a waterfall in the Rānchi district.

The next stage after *sumirānā* is the *rijhānā* or *rasānā*, or tickling the spirit. Song after song is sung in chorus by the *māti* and his disciples in accompaniment to music, to tickle the spirit into self-revelation. This goes on for hours, until the spirit, being thoroughly pleased with the singers, manifests its presence in the patient by making her shake her head. When the woman thus begins to shake her head, the *māti* declares that the spirit is now well pleased and is expressing its joy by dancing. Then the *māti* inquires, "What is thy name?" The patient, or rather the spirit through the mouth of the patient, says, "I am so-and-so. I require such and such sacrifices." Then she is asked, "Where will the *singhi* go?" The answer may be, "To so-and-so who set me on this woman at such and such a place."

The next stage in this process of exorcism is known as *rasnī-utārṇā*, the exorcism proper. By singing strings of long-winded *mantrams* of a suggestive nature the spirit is conducted from the hair of the patient to his face, from the face to the neck, from the neck to the shoulders, from the shoulders to the armpits, from the armpits along the elbows and wrist down to the palms of the hand, and thence out through the nails into the earth below. Lest any portion of the spirit-substance may be left behind in other parts of the patient's body, the same process is repeated in another direction, namely, from the head down into the collar-bone and thence through the ribs into the waist, and thence along the legs into the heels, thence along the toes and toe-nails into the earth again.

The fourth stage is known as the *singār-saparnā*, or getting hold of the spirit. Again songs are sung in which tempting promises of sacrifices are made to the spirit, which is thus induced to enter the flame of the *māti's* lamp. The next ceremony is the *bāndhnī*, or confining the spirit. The *māti* now intently examines the flame of his lamp to make sure that the spirit is there; and then, with a knowing look, as if to say "So, here you are," brings an oiled wick into contact with the flame of his magic lamp. The new wick thus lighted is quickly put into a new *singhi* which is at once closed up with an iron stopper. It is believed that the spirit passes into the flame of the wick, and is thus imprisoned along with the wick in the *singhi*. Some mud is then plastered over the stopper of the *singhi* to make escape impossible for the spirit. The *māti* and his disciples now go to the limits of an adjoining village with the necessary sacrifices, and there a little blood of the fowl or animal sacrificed is dropped on the *singhi*, which is then carried at dead of night to the house or a field of the person who had instigated the spirit, and there it is buried. The Mündās and Orāons believe that witches and *mātis* perform their magic feats with the help of some powerful spirits with which they have entered into compact and alliance. Such familiar spirits of the magician and the witch are called their *sādhak bhūts*. And the control exercised is really not that of the magician over the evil spirit harming a client but of one powerful *bhūt*—namely, the magician's *sādhak bhūt*—over another. As the witch and the *māti* exercise their art for their own benefit and for harming others, they are believed to die invariably a miserable death. The *māti's* *sādhak*, or familiar, is an

evil spirit which he holds under control ; as soon as this spirit gets out of hand it brings ruin on the *māti* himself. Whereas the *pahān*, or village-priest, the director of beneficent public magic, is respected and looked up to as the natural leader of the village, the sorcerer and witch are shunned and looked down upon as enemies of humanity. Here we see the tribal conscience of even such backward tribes as the Mūdās and the Orāons of Chōtā-Nāgpūr, recognizing the immorality of anti-social private magic. And the brutal persecution of a suspected or declared witch, of which we now and again hear rueful stories in Chōtā-Nāgpūr, however much we may condemn it, is due not to any perversity of nature but to a lamentable ignorance of the causes of phenomena, and to a laudable desire to punish the anti-social mischief-maker.

At present, as we have seen, the Chōtā-Nāgpūr aboriginal's conception of the universe is that of a battle-field where a ceaseless, though often silent, struggle is going on between himself and the powers of Evil, where he has to ally himself with the powers of Good to contend successfully against the powers of Evil, and where the evil powers are far more numerous, though not indeed more powerful, than the good ones. The prime care of every Orāon or Mūdā is, as we have seen, how to avert, control, or conciliate these evil powers, not for any spiritual benefit to himself—in the sense in which the man of higher culture understands spiritual benefit—but for securing the only treasures he cares for—his crops and his cattle and his own health and that of his own wife and children—from every possible harm. In this view of the matter, the man of the lower culture may appear to be grossly materialistic, and his spirituality, to which I referred at the outset, may seem to consist only in his theoretical recognition of the soul as the real man, his belief in the mysterious power of thoughts, words, and desires, and his haunting sense of the presence of spiritual forces emanating from various beings and objects on earth, water, and sky, and of a spirit-world surrounding him on all sides. But we should remember that to him everything, including even his crops and his cattle, are centres of spiritual energy—that the Orāon and the Mūdā believe that it is really the soul of the rice that gives them nutriment, and that, in their eyes, their cattle represent the cattle-deity to whom sacrifices are regularly offered once in the year. Thus we see that the man of the lower culture does not lose his essential spirituality even in pursuing his materialistic desires. Though material welfare pleases him, and poverty, want, and disease distress him, as they respectively please and distress his more civilized fellow-men, his serious thoughts rest on other things. As we have seen, the serious thoughts—the hopes and fears—of the Chōtā-Nāgpūr aboriginal, centre round the invisible presences and powers that fill all space. And his magical rites—his religious practices—his ceremonial observances as to periodical fasting, abstinence, and purificatory ablutions—and the special semi-religious training which an Orāon young man has to undergo in the secret society of the *Dhūmkūriā* (now gradually falling into disuse) are all meant to augment his own soul-power through alliance with beneficent powers.

LES TOUAREG DU SUD.

Par FR. DE ZELTNER.

[WITH PLATES XXXVI, XXXVII.]

HABITAT.

LES Touareg du Sud occupent une aire très vaste, mais difficile à délimiter exactement, vu qu'en bien des endroits leur territoire s'enchevêtre avec celui de leurs voisins, Maures ou nègres.

On peut dire qu'ils s'étendent entre 7° Long. Ouest Paris et 7° Long. Est.

Leur nombre, difficile à évaluer avec exactitude, est de 57,000 dans la Colonie du Haut-Sénégal-Niger, et de 30,000 dans le Territoire militaire de l'Afrique Occidentale française.

Quand on vient de l'Ouest, les premiers groupes de Touareg qu'on rencontre du côté de Nampala sont des fractions de Kel-Antassar et de Tenguiriguif. A proprement parler, ce sont plutôt les vassaux ou les captifs de ces tribus, qui vivent en plus ou moins bonne intelligence avec les Maures Allouch, les Peulh Ouorbé et les Sarakolé de Boundoubadi, Diarto et Sumpi.

¹ Ce travail est la transcription, développée sur certains points, d'une conférence que j'ai faite au *Royal Anthropological Institute*. On comprendra aisément que je n'ai pu traiter d'une façon complète un sujet aussi vaste que celui des Touareg. Aussi, me suis-je borné à des généralités, en développant d'une façon particulière certains points que mes études personnelles m'ont permis d'approfondir, et qui sont généralement négligés par les explorateurs. Pour les personnes qui désireraient se documenter d'une façon plus complète, j'indiquerai les ouvrages suivants, qui en dehors des ouvrages classiques de Barth, Nachtigal, et Bary, sont les plus importants pour les Touareg du Sud :

Maurice Delafosse, *Haut-Sénégal-Niger*, t. I, p. 191 (Historique des invasions touareg). Paris, E. Larose, 1912.

Maurice Cortier, *D'une rive à l'autre du Sahara* (Étude excellente sur les Touareg Iforas de l'Adrar). Paris, E. Larose, 1908.

Camille Jean, *Les Touareg du Sud-Est : l'Air*. Paris, E. Larose, 1909.

Cap. Aymard, *Les Touareg* (particulièrement ceux des rives du Niger). Paris, Hachette, 1911.

R. Chudeau, *Sahara soudanais* (Étude géologique et sociologique très importante). Paris, Colin, 1903.

Louis Desplagnes, *Le plateau central nigérien* (à utiliser seulement pour l'archéologie de la Boucle du Niger). Paris, E. Larose, 1907.

Docteur Decorse, *Les Touareg de la Boucle* "Bulletin de la Société de Géographie Commerciale de Paris," Octobre, 1907.

Mohammed Said, *Les Touareg de la région de Tombouctou* "Revue tunisienne," 1903, p. 34.

F, Foureau, *d'Alger au Congo par le lac Tchad*. Paris, Masson, 1905.

A l'Est, le domaine des Touareg s'arrête avec les derniers contreforts du massif de l'Aïr, à la limite du désert, qui le sépare de Bilma : au delà les Touareg ne vont que pour escorter les caravanes allant à Bilma, ou pour tenter quelque coup de main sur les campements du Tibesti.

La limite septentrionale est plus difficile à fixer. Ce sont encore les Kel-Antassar qui constituent le groupe extrême, à l'Ouest et au Nord du lac Faguibine. Il est juste de dire que les Kel-Antassar sont, d'après la légende, une tribu maure, qui aurait adopté la langue et les mœurs des Touareg. Cette particularité et leur caractère maraboutique leur permet de vivre côte à côte avec les Maures Allouch et Berabich. La frontière passe ensuite au sud de Tombouctou, pour se relever après cette ville, qui est, depuis la conquête française, soustraite à l'influence touareg. Elle suit ensuite la courbe du Niger, où la tribu des Irréguenaten voisine avec les Maures Kounta. Puis elle se relève brusquement à partir de Tosaye pour gagner le massif de l'Adrar des Iforas. A partir de ce point, les domaines des Touareg du Sud rejoignent ceux des Touareg du Nord, et la distinction entre ces deux groupes devient une pure convention. On peut cependant prendre pour base le 20° Lat. N., qui passe au Nord de l'Adrar des Iforas et de l'Aïr. Au Sud du Niger les Touareg forment un groupe très important, mais mal connu, qui occupe tout le sommet de la boucle du Niger, excepté les villages songrhay riverains du fleuve : le 15° Lat. N. peut être considéré comme leur limite Sud. Ne les ayant pas vus sur place je n'en parlerai point, mais j'ai tout lieu de croire qu'ils sont identiques à ceux d'entre eux que j'ai étudiés à Tombouctou.

ASPECT DU PAYS.

On comprendra aisément qu'une région aussi étendue que le pays habité par les Touareg présente des différences très marquées suivant les zones. Lorsqu'on vient de l'Ouest, la première contrée où on les rencontre correspond à la partie septentrionale de la province du Farimaké, et à la région des lacs Faguibine, Horo, Fati, etc., quoique assez peu habitée, elle ne constitue pas un désert, et se présente sous l'aspect d'un pays ondulé, où abondent les bouquets de palmiers hyphènes, et où l'humidité du sol entretient d'assez bons pâturages. Inutile de dire qu'à mesure qu'on remonte vers le Nord ceux-ci disparaissent, et le sable prend le dessus. Les Touareg ne s'écartent d'ailleurs pas beaucoup du Niger, et vivent mêlés à des Maures sans qu'il en résulte d'inconvénients graves. Depuis l'occupation française, ils respectent même les propriétés des cultivateurs songrhay, dont les villages s'égrènent le long du Niger, et des marigots qui y aboutissent.

Avant d'arriver à Tombouctou, l'aspect du pays change et devient complètement désertique : des dunes de sable fin, généralement de faible hauteur, alternent avec des taillis de mimosas et de gommiers. Là encore les Touareg Igouadaren, peu nombreux d'ailleurs, vivent mélangés aux Maures, qui appartiennent pour la plupart à l'importante tribu des Kounta, dont les tentes ne dépassent guère le 3° de Long. Ouest.

A partir du point où le Niger descend vers le Sud-Est, le paysage change encore. Des bancs de rochers, des collines pierreuses sortent de terre ; le sable devient plus gros ; les dunes sont fixées par la végétation des Mimosées ; des pâturages assez beaux se trouvent un peu partout ; enfin, entre les dunes, le sol argileux retient l'eau et forme des mares parfois très étendues, sur les bords desquelles poussent des arbres souvent très considérables. On commence à rencontrer de la latérite, des grès. C'est le domaine de la puissante confédération des Oulliminden, composée de tribus belliqueuses qui, avant l'arrivée des Français, partageaient leur temps entre l'exploitation des cultivateurs songhay et les expéditions contre les Maures Kountah.

Plus au Nord se trouve le massif de l'Adrar, qu'on appelle Adrar des Iforas pour le distinguer de l'Adrar de Mauritanie. C'est un ensemble de vallées assez étroites, pourvues d'une végétation clairsemée et de pâturages assez bons, séparées par des chaînes arides et inhabitées. Il est situé en bordure du Tilemsi, qui, à une époque très ancienne, fut un puissant fleuve, probablement affluent du Niger, et recevant lui-même de nombreux tributaires. Les Touareg Iforas, qui l'habitent, sont peu nombreux.

Entre Gao et Tahoua, le paysage présente cette monotonie triste des dunes couvertes de mimosas, mais en arrivant à ce dernier poste, on s'aperçoit qu'il y a quelque chose de changé à la constitution du sol, rien qu'en voyant la façon dont les chameaux marchent avec précaution, en choisissant les endroits où ils posent leurs pieds. Nous entrons en effet dans l'Adrar de Tahoua, vaste agglomération de grès et de latérite, où des chaînes de collines escarpées enserrent des vallées très riches et peuplées de Haoussa, qui sont à la fois agriculteurs laborieux et commerçants aventureux. C'est en dehors des terrains cultivés par eux que commence le domaine des Touareg Kel-Gress.

Quand on a descendu péniblement les dernières pentes de ces hauteurs, on a devant soi une immense plaine faiblement ondulée qui monte par une pente insensible jusqu'à Agadez. Ici, plus de mares aux bords ombragés de grands arbres : rien que des points d'eau largement espacés et constitués par des puits, souvent très profonds. Les mimosas sont clairsemés, et parfois disparaissent complètement. Par contre, les pâturages sont encore beaux jusqu'à Abellama. Pour arriver à ce puits, situé au bas d'une falaise élevée, il faut descendre un échelon assez important : ensuite, on traverse jusqu'à Agadez un désert de pierres également dénué d'eau, d'arbres et de pâturages. En sortant de cet enfer, c'est une sensation exquise de voir la palmeraie qui s'étend au Nord de la ville, sur les bords du Tiloa, et marque le commencement du massif de l'Aïr. Celui-ci présente un aspect bien caractéristique. Qu'on imagine un ensemble de montagnes abruptes aux angles vifs, aux contours âpres et tourmentés, dépourvues de toute végétation, que le ruissellement pluvial n'a pas eu le temps de modeler ; des vallées étroites, ornées d'une végétation robuste, palmiers et mimosas de grande taille ; de bons pâturages, occupant pendant une partie de l'année le lit des cours d'eau, grâce à une nappe souterraine qu'il est facile d'atteindre par des puits peu

profonds. Il y a quelques centres habités par des noirs, qui cultivent du blé et de l'orge entre les dattiers de ces petites oasis. Les tribus des Kel Gress, des Kel Oui et des Kel Feronan se partagent la suprématie sur l'Aïr, qui est à la fois une réserve de pâturage et un asile sûr, où en cas d'attaque des ennemis, on peut cacher les familles et les campements.

ORGANISATION.

Dans une région à caractère aussi tranché que le pays touareg, il n'a pu se développer qu'un régime politique très particulier : la seule organisation qui pouvait s'appliquer à la mentalité des Touareg comme au milieu inhospitalier où ils vivent, est le régime féodal. Et on peut affirmer qu'ils l'ont poussé jusqu'à ses plus extrêmes conséquences. L'émiettement indéfini du pouvoir a eu comme effet l'établissement d'une anarchie presque sans limites. En fait, avant l'arrivée des Français, chacun ne relevait que de son épée. L'état de guerre était d'ailleurs le seul qui convînt à la mentalité belliqueuse, aux besoins modestes, et à la situation économique fâcheuse des Touareg. Les auteurs anciens attestent que le Sahara fut toujours un nid de brigands, et son appauvrissement progressif, par suite de la diminution de l'humidité, n'a pu que stimuler les goûts combatifs des Berbères, forcés de piller pour vivre. L'existence des trois grands massifs du Hoggar, de l'Adrar des Iforas et de l'Aïr, tous trois abondants en retraites inaccessibles, était également un avantage dont les Touareg ont su se servir. Et quelle tentation pour ces grands enfants, vaniteux et avides, que le passage des riches caravanes qui circulaient entre l'Afrique du Nord et le Soudan ! L'or, les parfums, les vêtements aux couleurs éclatantes, les esclaves surtout, indispensables à ces nobles coupeurs de route, voilà plus qu'il n'en fallait pour faire surgir les écumeurs du désert. Si l'on joint à cela le besoin d'émotions violentes, l'attrait de la gloire, la soif d'épopée qui caractérise les primitifs, on a les principales causes qui ont fait du Touareg ce qu'il est aujourd'hui, un être impulsif, fier de son passé indépendant, découragé devant la civilisation qui l'encercle, irrité des entraves qu'elle lui impose, trop arriéré pour la comprendre, et trop profondément personnel pour pouvoir se modifier : en un mot, un *inassimilable*.

Voyons donc en quoi consistait son organisation.

La société Touareg est divisée en quatre classes : les nobles, *Imochar* ; les vassaux, *Imrad* ; les captifs, *Iklan* ; les griots et ouvriers, *Inadan*. Cette division est la même de l'Ouest à l'Est, mais elle varie d'importance suivant les lieux. Dans certains groupes, comme chez les Iforas de l'Adrar et les Oulliminden, il existe des tribus de vassaux qui sont riches, puissantes et respectées ; elles ne paient aux nobles que des redevances insignifiantes sous forme de cadeaux. Par contre, dans la région de Tombouctou, les vassaux, appelés *Daga*, sont très pauvres et constamment pressurés par les nobles. D'une façon générale, la tradition règle les droits et devoirs de chacun.

Il existe aussi, principalement dans l'Aïr, des tribus maraboutiques qui ne portent pas les armes et se confinent dans les pratiques religieuses et l'élevage.

Chez les Iforas et les Oulliminden, ces groupements sont peu nombreux et misérables, mais en Air, ils sont au contraire fort riches et très respectés.

Qu'elle soit noble ou vassale, chaque tribu se choisit un chef qui la représente en toute circonstance et la dirige dans tous les cas nécessaires. Ce chef ne peut être choisi que dans quelques familles, et c'est la réunion de tous les chefs de tribus qui nomme l'*Aménokal*, c'est à dire le chef suprême, le sultan de ce groupe de tribus. Il existe plusieurs confédérations de tribus, et partant plusieurs aménokal ; les plus connus sont ceux des Iforas, des Oulliminden et des gens de l'Air : ce dernier est le sultan d'Agadez.

Bien que l'autorité de l'Aménokal soit subordonnée à sa richesse, à sa générosité et à son influence personnelle, ce poste est des plus recherchés, et on se fait difficilement une idée des marchandages et des corruptions qui se produisent à l'occasion d'une élection. Il va de soi qu'une fois élu le nouvel aménokal s'efforce de rentrer dans ses débours en pressurant ses contribuables les moins puissants. L'arrivée des Français a porté un grand préjudice à ces combinaisons, en établissant pour les personnes lésées un recours efficace devant les tribunaux. En même temps, l'autorité de l'aménokal s'est trouvée affermie, en ce sens que ses décisions sont exécutées, ce qui n'était pas toujours le cas autrefois, et, qu'à moins de faits graves, il n'est jamais révoqué, tandis qu'il y a quelques années, les grands électeurs le déposaient fréquemment pour se faire donner des cadeaux par les nouveaux candidats. Il en résulte que l'ordre n'est plus que rarement troublé, et jamais d'une façon grave, puisque les détachements de tirailleurs montés à chameau sont toujours prêts à faire respecter les décisions des autorités et à réprimer les désordres.

La situation des captifs peut se comparer à celle des vassaux ; dans certains groupes elle est misérable, dans d'autres elle est assez enviable. D'une façon générale, les Touareg sont assez bienveillants pour leurs serviteurs, les brutalisent rarement, ne les vendent pas, et sont familiers avec eux. Mais dans les régions où la vie est dure, les captifs ont à souffrir de beaucoup de privations, surtout en ce qui concerne la nourriture, la boisson, le costume. J'ai vu dans certains campements des Touareg de l'Ouest, des tentes réservées aux selles et aux bâts des chameaux, tandis que les captifs restaient, avec leurs familles, au soleil. Il faut croire d'ailleurs que leur situation ne leur paraît pas si pénible, puisque dans certaines régions, comme celles de Tombouctou et de Gao, ils pourraient facilement quitter leurs maîtres pour entrer dans les villages de liberté, formés d'anciens esclaves : et pourtant ils n'en font rien et continuent à mener avec leurs maîtres une existence misérable. C'est chez les Touareg de l'Ouest que leur position est la plus triste : à mesure que l'on va vers l'Est, elle s'améliore, et dans l'Air, on voit des captifs qui jouissent de la confiance de leurs maîtres, sont habillés comme eux, et portent même les armes, avec une restriction toutefois – au lieu de l'*Allar*, grande lance toute en fer, ils n'ont que la *Tarda*, dont la hampe est en bois ; le reste de l'armement est le même.

Les artisans se groupent en trois catégories : ceux qui travaillent le cuir, ceux

qui travaillent le fer et le bois, et enfin les chanteurs : on les réunit tous sous le nom d'*Inadan* (singulier *Ined*).

Etant donné l'usage considérable d'objets en cuir que font les Touareg, on peut imaginer que les premiers sont nombreux : ils fabriquent les sacs à provisions, à vêtements, à munitions, les sacoches, outres, portemonnaies, boucliers, chaussures diverses, les fourreaux des sabres et des poignards, les coussins et les innombrables amulettes dont se couvrent les Touareg.

Les forgerons travaillent le fer et le bois en même temps : dans la première spécialité ils fabriquent et réparent les épées, les lances, les poignards, les mors de bride, les étriers, quelques rares fusils : ce sont d'habiles bijoutiers ; dans la seconde spécialité, leur activité est plus étendue, car les nomades ont beaucoup d'objets et d'ustensiles de ménage en bois : pilons, mortiers, vases de toute sorte, cuillers, entonnoirs, tamis, piquets et supports de tente, lits, selles à chameaux et à chevaux. La fabrication des diverses sortes de nattes leur incombe aussi ; elles jouent un grand rôle dans la vie nomade. Ils font également les bracelets en pierre, dont les Touareg sont très amateurs.

Quant aux chanteurs, ils correspondent exactement aux "griots" des populations soudanaises. Tantôt ils composent des vers et les chantent sur des airs qu'ils créent eux-mêmes, tantôt ils répètent des épopées qu'ils ont apprises de leurs pères et qui relatent les hauts faits des héros. Leur rôle est surtout considérable en temps de guerre, car ils excitent au combat les guerriers, et les mettent dans un état de surexcitation qui les rend très dangereux. Ils chantent aussi les louanges des gens qui sont susceptibles de rétribuer leurs services, et en cela, ils peuvent acquérir quelques richesses. Ils sont par contre très méprisés et un peu craints, quoiqu'ils n'aient pas l'effronterie de leurs confrères noirs à qui tout est permis.

RELIGION.

Comme tous les Berbères, les Touareg sont plus superstitieux que religieux ; les marabouts jouent chez eux un certain rôle, mais c'est plutôt parce qu'ils sont experts en la confection de charmes et d'amulettes, que parce qu'ils enseignent leur religion. D'après la légende, les Touareg ont marqué peu de sympathie pour celle-ci, puisqu'ils l'ont reniée treize fois avant de l'adopter définitivement. Il est permis de croire qu'ils en ont modifié profondément l'esprit. Nous n'avons d'ailleurs que de vagues renseignements sur la religion qui a précédé l'Islam ; elle comprenait, semble-t-il, un certain nombre de divinités locales comme le dieu Bacax ou Bacos et la déesse Tanit, et pratiquait des fêtes saisonnières et des rites orgiaques qui ont laissé quelques traces chez les Berbères du Nord. On peut sans doute y rapporter deux fêtes qui remontent certainement à une haute antiquité et qui se pratiquent actuellement dans l'Air. Le nom générique des fêtes est *barka désallah*, bénédiction de Dieu, qui est en même temps la formule de salutation et répond à notre : Vous portez-vous bien ?

La fête de *Bianon* commence l'année pour les gens d'Agadez, où je l'ai vu célébrer : en 1911 elle tombait le 31 décembre, soit le neuvième jour du mois

de *Tezedoufen* (en arabe *Moharrem*). La veille au soir, tous les jeunes gens, mariés ou célibataires, sont allés coucher dans la palmeraie qui environne le puits d'Alarsess, à 2 kil. de la ville. Au matin, ils sont revenus vers la ville, formés en deux groupes, au son des tam-tam, richement habillés, et parés de tous les bijoux qu'ils ont pu se procurer, même de bijoux féminins. Bien qu'armés de lances et de sabres, ils tenaient à la main des palmes. De place en place, les tam-tam s'arrêtaient et jouaient plus fort : les jeunes gens couraient autour en ronde, poussant des cris, chantant, brandissant leurs palmes et *simulant l'ivresse*. Cette dernière circonstance mérite d'être notée chez un peuple où l'usage des boissons fermentées n'existe pas et dont la sobriété est proverbiale : elle m'a pourtant été confirmée par nombre d'indigènes dignes de foi, et ne fait aucun doute. Rentrés en ville avec leurs tam-tam, les jeunes gens se sont répandus dans les rues. Ils ont le droit, lorsqu'ils rencontrent quelque personne portant des victuailles, de prendre ce qu'ils veulent sans payer : toutefois, ils ne peuvent entrer dans les maisons. Ce jour-là les femmes et les filles nubiles ne sortent pas.

Il y a quelques années, pendant la nuit passée à Alarsess, les jeunes gens se fabriquaient, avec des palmes, des lances et des sabres. Le jour venu, ils se divisaient en deux troupes, dont une commandée par le Sultan d'Agadez, et se livraient un furieux combat, se frappant avec acharnement jusqu'au moment de rentrer en ville. Les blessures et même les morts qui se produisaient dans cette action n'étaient pas punies, et ne donnaient pas lieu à compensation.

L'origine de cette fête est inconnue ; elle s'est toujours faite à Agadez. Chez les Haoussa du Sokoto, on l'appelle *Oou-Oou*. Les marabouts n'y jouent aucun rôle ; les femmes en sont exclues.

On a trop souvent signalé des fêtes analogues chez les Berbères pour que j'insiste sur le caractère particulier de celle-ci¹ : la seconde que j'aie vue est d'un caractère plus calme.

On l'appelle *Fourfourou* ; en 1911 elle tombait le 1er Mars. Ce jour, l'après-midi, le sultan d'Agadez sort à cheval de son palais entouré de tous les dignitaires à cheval, les joueurs de tam-tam et de flûte ; le peuple est en vêtements de fête : beaucoup de gens portent des palmes dépouillées de leur limbe, réduites à la nervure. Avec le sultan à sa tête, le cortège sort de la ville, à l'ouest, et se dirige vers une bosse de terrain appelée *Toulomba*, où il y a des ruines de maisons en briques crues. Il en fait deux fois le tour au pas. Pendant ce temps les cavaliers se détachent et font une sorte de fantasia : l'un protégé par son bouclier part au galop, un autre le poursuit et lui lance une javeline faite d'une nervure de palme. Cet exercice se répète plusieurs fois sans que le cortège s'arrête, et ses deux tours une fois faits, dans le même ordre il regagne la ville. Il m'a été impossible de recueillir d'indications sur cette cérémonie, sauf qu'elle a toujours existé. Les indigènes disent même ne pas savoir ce qu'était autrefois Toulomba.

¹ Mannhardt, *Baumkultus*, p. 251. Frazer, *The Golden Bough*, t. i, p. 301. Doutté, *Magie et Religion dans l'Afrique du Nord*, p. 555.

LA RACE.

Maintenant que nous avons esquissé dans leurs grandes lignes le milieu physique, ainsi que les conditions économiques et sociales dans lesquelles vivent les Touareg, nous sommes en droit de nous demander dans quelle mesure ceux-ci ont été façonnés par ceux-là, et d'essayer, après bien d'autres, d'en tracer un bref portrait, au physique comme au moral.

Grand, élancé, nerveux, l'ossature et la musculature légères, les extrémités fines, la peau brune, les cheveux longs et ondulés, le Touareg se distingue surtout des populations qui l'environnent, par sa face. C'est un lieu commun de dire qu'il ressemble aux Européens. Le front est large, un peu fuyant, se raccordant au crâne par une courbe continue. Les arcades sourcilières forment souvent un bourrelet plus ou moins saillant au dessus des orbites, qui sont vastes, profondes et abritent des yeux bruns ou noirs, très vifs, fendus en amande. Le nez, grand, mince, droit ou aquilin, a une racine très haute et très mince qui continue presque sans dépression la courbe du front. Son extrémité est fine, souvent abaissée, ses narines minces et détachées. La bouche est petite, les lèvres, roses, sont bien dessinées et peu épaisses. Le menton, arrondi, est généralement saillant, et contribue, avec des arcades zygomatiques proéminentes, à donner à la physionomie un air d'intrépidité agressive. Sa démarche est d'une noblesse et d'une élégance suprêmes, sa tenue d'une dignité parfaite : il donne l'impression d'un être toujours prêt au combat. Sa résistance à la fatigue, aux privations, est prodigieuse. Sa vue perçante, sa mémoire visuelle très fidèle, son don inné d'observation, tous ses sens merveilleusement exercés en font un coureur de brousse hors de pair, et adapté d'un façon complète à son genre de vie et à son pays.

Sa femme présente les mêmes caractéristiques, mais atténuées. Dans sa jeunesse, sa souplesse, sa fraîcheur, sa grâce la rendent charmante, mais elles durent peu, et la pénible vie de la brousse, les soins du ménage, l'alimentation parcimonieuse, les fatigantes maternités la transforment la plupart du temps en une grande créature sèche, osseuse et fanée. Parfois, cependant, il en est autrement, et l'on rencontre, surtout chez les Touareg aisés et les marabouts, des femmes dont l'embonpoint paradoxal semble en contradiction flagrante avec l'aspect stérile du pays où elles vivent. C'est en ingérant chaque jour de prodigieuses quantités de lait et en gardant une immobilité presque absolue qu'elles arrivent, au bout de quelques années, à acquérir un développement adipeux, situé dans les régions lombaire et fémorale, qui rappelle fâcheusement la Vénus de Brassempouy, et complique extrêmement leur existence. Elles en sont réduites à ne pouvoir presque se lever et ont besoin d'une aide étrangère dans des circonstances où on s'attendrait le moins à la trouver. Les Touareg attachent beaucoup de prix à la stéatopygie et recherchent la main de ces beautés dont les opulences postérieures sont célébrées par les poètes, tout comme dans *les Mille et une Nuits*. Ce n'est pas ici le lieu de s'étendre sur ce sujet, mais il est curieux de voir la persistance du goût pour la stéatopygie, depuis les temps préhistoriques et

protohistoriques dont on connaît les statuettes nombreuses en Europe, en Orient et en Egypte.

Voyons maintenant le portait moral du Touareg. Il est impulsif, versatile, menteur, vaniteux, querelleur, indiscipliné, pillard, avide, quémandeur, flatteur, et en même temps brave, chevaleresque, généreux, énergique, ayant le sentiment de l'honneur, beaucoup de tact, de délicatesse et de savoir-vivre. Tous ceux qui ont été en contact avec les Touareg les considèrent comme des pillards, non comme des voleurs. Mais, outre les côtés élevés de leur caractère, ce qui les distingue de leurs voisins, Maures et Noirs, c'est leur respect profond de la femme, la déférence qu'ils lui témoignent et le cas qu'ils font de son approbation.

Pour plaire aux femmes, il n'est chose que le Touareg ne fasse : rien ne nuit plus à un homme que la réputation d'être peu galant ou peu généreux avec elles. Un visiteur qui arrive dans un campement salue autant les femmes que les hommes sous peine d'être taxé de grossièreté. Les femmes, qui sont souvent l'objet de véritables passions, sont consultées dans les actes importants de la vie, et leur influence est très grande, ainsi qu'on l'a observé chez d'autres Berbères. Bref ce n'est pas exagérer que de considérer la société touareg comme une *gynécocratie*.

De la passion qu'ont les Touareg pour les femmes peut être rapproché le goût qu'ils ont pour la poésie et la musique. Outre que chacun d'eux connaît par cœur un grand nombre de poésies et d'airs de musique, le nombre des improvisateurs est très grand. Soit dans les réunions très fréquentes d'hommes et de femmes, soit dans des circonstances particulières, comme l'arrivée d'un hôte, ou la rencontre d'un ennemi, soit pour charmer les longueurs de la route, il se trouve toujours quelque poète pour improviser des vers de circonstance, qui, autant que j'ai pu en juger par les traductions, ne manquent ni de poésie ni de vigueur. Il y a d'ailleurs toute une catégorie de chanteurs, analogues aux "griots" des nègres, dont la fonction consiste à célébrer les louanges des guerriers illustres (et surtout généreux), à les exciter au moment du combat, à chanter la beauté des femmes, et à réciter des légendes.

* * * * *

Il prématuré, en l'état actuel de nos connaissances, de répartir les Touareg en types nettement distincts. J'ai cependant essayé de le faire, en prenant pour base les types créés par Bertholon et Chantre, et je ne suis arrivé à aucun résultat. Il est pour le moment impossible, du moins chez les Touareg du Sud, d'arriver à des groupements qui permettent d'affirmer l'existence de types anthropologiquement distincts. En dehors des croisements avec les nègres, les Maures et les Peulh, il y a entre les divers éléments que contenait la race au début tant de mélanges, qu'il est impossible actuellement de faire le départ de ce qui appartient à l'un ou à l'autre. D'autre part, les fouilles que j'ai faites dans les tombes anciennes n'ont donné aucun résultat : elles ne contenaient que des fragments d'os minimes, ou bien, si les os étaient entiers, ils tombaient en poussière au premier contact. Il m'est donc impossible de dire quels étaient les ancêtres des Touareg dans ces régions.

Je résume dans le tableau suivant les recherches anthropométriques que j'ai faites sur 143 Touareg mâles.¹

	Moyenne.	Maximum.	Minimum.	Maximum de sériation.
Taille	172 ·5	188 ·0	154 ·0	168 ·0
Indice céphalique	71 ·78	81 ·0	64 ·0	73 ·0
„ facial	85 ·44	101 ·0	68 ·0	88 ·0
„ nasal	66 ·34	84 ·0	50 ·0	68 ·0
Rapport envergure-taille ...	103 ·3	109 ·0	97 ·0	103 ·0

L'HABITATION.

Etant données les conditions particulières que présente le pays touareg, il n'est pas surprenant de constater que les habitations ont également une physionomie spéciale. Pour les nomades, la tente ou la hutte démontable : pour les sédentaires, la maison à terrasse en terre battue. Ces trois types sont extrêmement anciens, mais il semble qu'il y ait eu autrefois un autre type, abandonné actuellement, la construction en pierres, qui a joué un certain rôle à l'époque où le Sahara était plus peuplé et plus fertile qu'il ne l'est aujourd'hui. Dans beaucoup d'endroits, mais surtout dans le massif montagneux de l'Aïr, on trouve les ruines de petits édifices, dont les murs, assez bien conservés, sont construits en pierres de dimensions égales, choisies avec soin, mais non taillées, placées en double épaisseur, et assemblées avec de la terre glaise comme ciment. J'ai vu un seul cas de mur fait de dalles fichées en terre, comme le mur dit berbère ; c'était, je crois, une simple clôture. On peut dans les ruines distinguer plusieurs formes. La plus simple est un carré ou un rectangle de modestes dimensions (Figs. 1 et 2), souvent dénué de

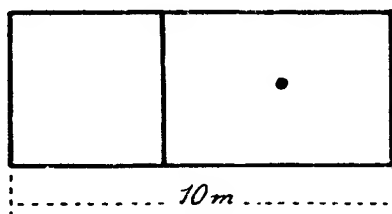


FIG. 1.

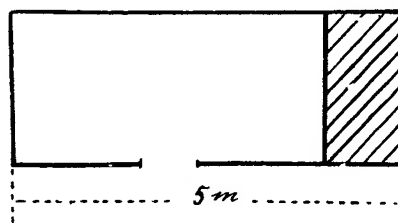


FIG. 2.

porte. Vient ensuite une construction plus compliquée (Fig. 3) où des rectangles bien construits sont accolés par d'autres plus petits et moins soignés : certaines lignes de pierres irrégulières ont peut-être été des parcs à bestiaux. Dans certains

¹ Je renvoie, pour plus de détails à mon travail : Étude anthropologique sur les Touareg du Sud : en *l'Anthropologie*, 1915.

cas, on voit toute une série de pièces juxtaposées et bien distinctes (Figs. 4, 5, 6). Enfin la Fig. 7 donne le plan d'un édifice appelé aujourd'hui *Tarajemt n'Amenokal*,

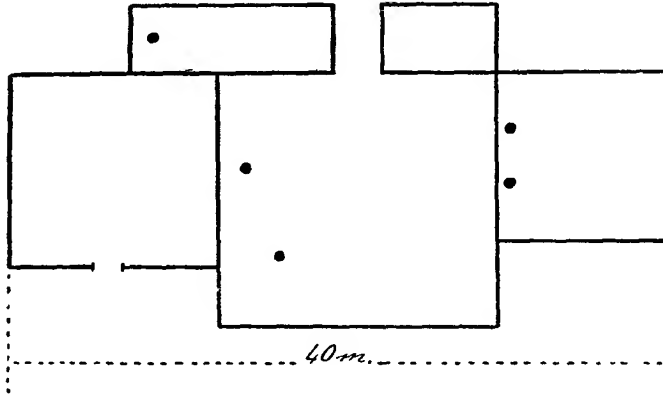


FIG. 3.

la maison du chef, et qui aurait été bâtie par un sultan venu de Stamboul. La solidité de la construction comme sa position sur le bord d'une croupe escarpée

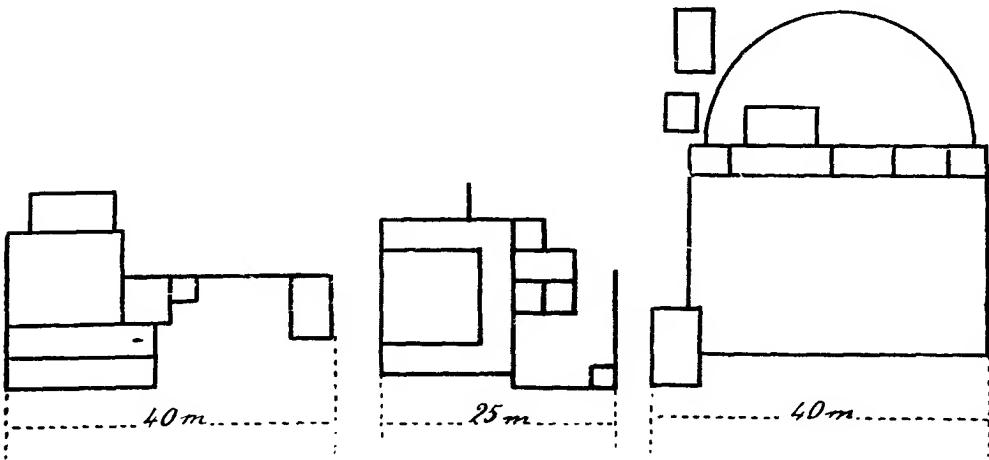


FIG. 4.

FIG. 5.

FIG. 6.

indiquent que nous sommes là en présence d'un fortin disposé pour résister à un siège comme à un assaut. L'agencement intérieur indique des magasins ou des logements de petites dimensions, tandis que la hauteur du mur d'enceinte (2 à 3 m.), son épaisseur (40 cm. au sommet), ainsi que l'existence d'une seule porte atteste que l'éventualité d'une attaque avait été envisagée.

Une chose frappe au premier abord en voyant l'ensemble de ces ruines : c'est l'absence d'ouvertures : certaines ont des portes, aucune n'a de fenêtre. Les habitants tenaient évidemment à être à l'abri des variations de la température extérieure, et peut-être aussi à enfermer leurs personnes et leurs biens de façon sûre. Dans les cas où il n'y a pas de porte, il faut admettre qu'il y avait une ouverture située assez haut et que le bâtiment servait de magasin, ou alors qu'il n'était qu'une enceinte, un *téménos* servant de lieu de culte.

Il est également remarquable que les murs sont toujours rectilignes ; je ne connais que deux exceptions : une petite case où le mur opposé à l'entrée était courbe, donnant une sorte d'abside, et la maison de la Fig. 6, dont le mur en demi-

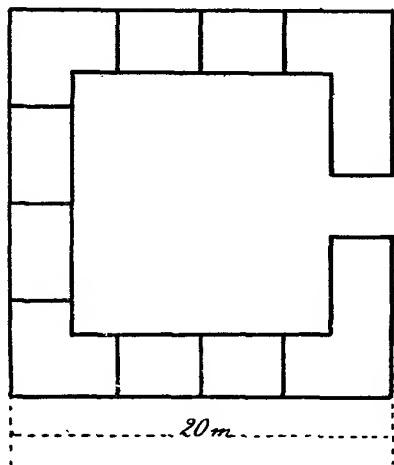


FIG. 7.

cercle n'est qu'un parc à bestiaux. Les cercles de pierres étant abondants dans la région, c'est sans doute à une cause rituelle qu'est due l'interdiction de l'emploi du cercle dans ces constructions. Dans un pays aussi troublé, quelques tours auraient eu leur utilité.

La construction de la Fig. 7 mise à part, il semble que l'interprétation que l'on doit donner à toutes les autres soit celle de fermes ou de magasins. En effet ce que nous savons sur les habitations antiques, telles que le palais de Knossos, montre que l'on aimait à y multiplier les pièces de petites dimensions, sans doute parce qu'elles étaient plus faciles à couvrir.

Les maisons actuelles de Tombouctou nous donnent un exemple de l'utilisation de ces sortes de labyrinthes, qui semblent peu pratiques à nos idées occidentales, et que les indigènes apprécient beaucoup soit comme logement, soit comme magasin. J'inclinerais à croire que nos ruines de l'Aïr sont celles de fermes analogues à celles qu'on trouve actuellement au Maroc, susceptibles de résister à un coup de main, mais non construites en vue de subir un véritable siège. Les plus petites d'entre elles n'étaient sans doute que des greniers, et ceci expliquerait qu'elles sont souvent dénuées de porte. Certains murs restés intacts semblent indiquer une hauteur maxima de 2 m. environ.

Une chose paraît surprenante, c'est qu'elles n'aient pas d'orientation fixe ; elles utilisent simplement le terrain, de la manière la plus favorable. Certaines dont les murs sont en bon état, sont encore habitées, par exemple à Aoudéras ; en d'autres, on constate des traces de réutilisation peu anciennes ; quelques poutres en bois de palmier restent sur les murailles. Sur le sol, des tessons de poteries, des débris de bracelets en schiste.

Pour les Touareg, ces constructions sont "les maisons d'Anebda." Ce héros, dont on ne peut dire s'il est un Dieu, un esprit, ou un homme, a laissé des souvenirs dans le pays, dont il fut le premier habitant.¹ Ses gens demeuraient dans des maisons du type de la Fig. 1, que l'on m'a montrées à Irinalam, et cachaient leurs provisions dans des constructions très primitives, analogues à celles que les Touareg de l'Aïr avaient l'habitude, il y a encore peu de temps, de pratiquer dans la montagne, et où, en cas de troubles, ils déposaient tout ce qu'ils ne pouvaient emporter. Ils fabriquaient pour cela une sorte de ciste avec des dalles posées sur champ qu'ils recouvraient de larges pierres plates. Une fois les objets en place, on

¹ Voir mes *Contes du Sénégal et du Niger*. Paris, Leroux, 1913.

empilait dessus des cailloux, et l'ensemble ne différait guère des cairn que l'on voit fréquemment. Les Touareg ont abandonné ce procédé devenu inutile, disent-ils, "depuis que les Français vont partout avec leurs tirailleurs."

Une particularité digne de remarque se voit dans une ruine représentée par la Fig. 2: le plus petit des compartiments est surélevé de 1 m. environ, tandis que l'autre est au ras du sol. On a signalé un dispositif analogue au Sahara¹. Quant à savoir si nous sommes là en présence d'une sépulture, j'avoue n'avoir aucune opinion sur la question; d'une part il m'est arrivé de voir des tombes formées d'une enceinte de blocs, dont l'intérieur était surhaussé; d'autre part j'ai peine à considérer comme une sépulture une disposition qui s'écarte tellement de ce que nous savons des tombeaux tant pré-islamiques que musulmans. A noter que dans les environs des ruines on rencontre toujours des cimetières musulmans très régulièrement disposés et pourvus d'épithaphes arabes. Il faudrait donc admettre ou que cette forme de tombe était antérieure à l'Islam, ou qu'elle recouvrait une personne qui avait mérité une inhumation toute particulière.

Je n'ai pas manqué, comme bien on pense, de faire des fouilles dans les ruines, quand les circonstances le permettaient. Elles n'ont été couronnées d'aucun succès. A une petite profondeur, j'ai trouvé des tessons de poterie rouge sans ornements; plus bas, rien du tout. En aucun cas je n'ai trouvé ni ossements, ni pierres taillées.

Nous sommes donc sans données certaines sur la date de ces ruines; les traditions des indigènes sont, on l'a vu, bien vagues; le mode de construction ne nous vient pas en aide; les fouilles sont muettes. Le voisinage des cimetières musulmans donne une présomption en faveur d'une date récente. Mais par contre, la présence d'arbres assez gros poussés dans l'intérieur des pièces permet de croire qu'elles ont été abandonnées il y a déjà un certain nombre de siècles. D'autre part la tradition de la construction en pierres est perdue dans le pays.

Sauf meilleur avis, je pense donc que les constructions dont nous voyons les ruines dans l'Aïr ont été faites au début de la période islamique, à une époque où il existait encore des groupements sédentaires assez nombreux dans cette région, groupements peut-être de race noire, et qui pratiquaient la religion musulmane.

* * * * *

Comme habitations modernes, les Touareg sont peu favorisés, vu que ceux d'entre eux qui résident dans les villes habitent des maisons en pisé construites par des sédentaires, Songrhay ou Haoussa. Le minaret de la Grande Mosquée d'Agadèz, bâti vers 900 après J. C. par les Kel-Gress, est certainement l'œuvre de maçons indigènes. Les maisons de la ville d'Agadèz, comme aussi celles de Tombouctou, de Gao, de Tahoua, sont du type commun à tout le Sahara, qui a d'ailleurs de grandes analogies avec les bâtiments de l'ancienne Egypte.

Dans les oasis les sédentaires habitent des huttes en terre, mais ce sont des noirs.

¹ Capitaine Bernard: *Monuments de pierres brutes chez les Touareg Azgar*. *Revue Archéologique*, 1814, pp. 208 211, 213.

Il n'existe donc pas, à parler exactement, de maisons touareg; la vraie demeure du nomade est sa tente, et il faut reconnaître qu'elle est admirablement adaptée à ses besoins, à sa mentalité, au climat, et au genre de vie qu'il mène. Chez les Touareg de l'Ouest, la tente est un vaste parallélogramme en peaux de chèvre ou de mouton, tannées et colorées en rouge. Une belle tente comprend soixante peaux. Elle est soutenue au milieu par une perche dont l'extrémité supérieure pénètre dans un bloc de bois courbe, l'*adouailel*, qui l'empêche de crever la tente. Des perches plus courtes soutiennent celle-ci plus loin, et les bords sont fixés au sol à l'aide de piquets. La hauteur totale atteint au plus 1 m. 80, la largeur 4 m., la longueur 6 m. Ce type de tente, que l'on voit parfois aussi chez les Maures, ne dépasse pas le méridien de Paris. Au delà, on trouve la tente en nattes, ou, pour mieux dire, la hutte démontable. Celle-ci se compose essentiellement d'une carcasse formée de piquets fixes, assez bien équarris, sur lesquels viennent s'adapter des cintres formés de baguettes courbées et attachées ensemble. Sur le tout on place des nattes plus ou moins fines, suivant le rang et la fortune de l'habitant, faites en graminées ou en feuilles de palmier. D'autres nattes jonchent le sol, ou servent de porte. L'ensemble est fort propre et assez confortable. Je n'ai vu de ces types que des huttes de dimensions modestes, ne dépassant pas 1 m. 50 de hauteur, mais j'ai ouï dire que les tribus maraboutiques, comme les Débackar, possédaient des huttes analogues qui avaient les dimensions d'une maison et qui étaient régulièrement disposées en forme de rues. On en voit jusqu'aux confins de l'Aïr, où commencent à se montrer les tentes en poil de chameau des Hoggar.

LES SÉPULTURES.

On pourrait presque dire qu'en pays touareg les morts sont mieux traités que les vivants. Les sépultures sont soignées et ne souffrent jamais d'un manque d'égards de la part des Touareg, comme il arrive parfois en pays noir. Les formes qu'elles revêtent sont peu nombreuses. Tantôt c'est une enceinte de forme circulaire, ovale, carrée ou rectangulaire, de pierres dressées, plus ou moins hautes dont le sol est exhaussé de 0 m. 50, et recouvert de cailloux roulés de couleur blanche formant comme un pavage régulier. Ce type, dont le nom est "*Adebni*" ou "*Agagir*", n'a pas varié depuis les temps les plus anciens, mais actuellement quand la fosse est rectangulaire, elle est très étroite (30 à 40 cm. au maximum) et orientée vers la Mecque; de plus à la tête et aux pieds se trouvent deux dalles dressées: ce sont les "*Chehed*", les témoins qui attestent la foi musulmane du défunt. Souvent une enceinte de cailloux se trouve encore à l'extérieur. Dans certains cas, on enterre le cadavre sous un cairn assez considérable de cailloux, pour éviter sa profanation par les hyènes. Ces tombes portent le nom de *T'iseska* (au singulier *Taseskot*).

Enfin un type assez commun dans l'Aïr est l'inhumation dans une fente de rocher. On l'appelle "*Takarit*"; un entassement de pierres plus ou moins grosses défend le cadavre.

Il est parfois très difficile de distinguer une sépulture ancienne d'une moderne.

quand elle est de forme circulaire et ne possède point de "*Chehed.*" Les intempéries ont rapidement donné aux blocs de l'enceinte la patine foncée du désert, et quant à la forme, elle ne diffère guère. On rencontre souvent les tombes groupées d'une façon plus ou moins régulière. Quand elles sont du type circulaire, appelé "*Basina*" dans le Sahara, on les trouve souvent accolées par trois ou quatre autour d'une tombe centrale appartenant à un saint personnage. Cette disposition cellulaire peut s'étendre parfois à un groupe plus étendu, dix à douze tombes. En général autour de la tombe d'un personnage vénéré, les autres tombes viennent se grouper dans un rayon assez court. J'ai même constaté deux cas où cette coutume a été suivie par des musulmans, à Irinalam et à Anou-Sama, où des nécropoles très vastes se sont groupées autour de trois tombes circulaires accolées en trèfle ; au S.E. d'Agadèz, le cimetière des Belkoré est orné au milieu d'une petite pyramide à gradins en terre, où est enterré leur chef, Ahmed Salatik, mort il y a 400 ans.

Les tombes musulmanes reçoivent parfois une décoration particulière, consistant en une perche à laquelle sont accrochés quelques chiffons, ou en une pièce de bois découpé, appelée "*Tagueïdeket*" qui se place d'ordinaire devant la tente ou à côté du lit des nobles Touareg. L'épithaphe, quand il y en a une, est gravée sur la pierre qui est à la tête du corps ; j'en ai vu incisées dans des poteries, après cuisson. Parfois elle est gravée sur une meule en pierre ; les Touareg affirment que cela indique une sépulture féminine. J'ai trouvé quelquefois des pierres de 1 m. de hauteur environ dressées à côté des tombes circulaires.

Près des tombes rectangulaires j'ai rencontré des dalles verticales avec des signes gravés ; l'un avait la forme d'une croix surmontée d'un trait vertical, l'autre d'un cercle prolongé en bas par un trait. Pour ce dernier, M. René Basset pense qu'il représente le vase rempli d'eau où s'abreuvent les oiseaux en qui s'incarne l'âme des morts. J'ignore le sens du premier.

On connaît l'usage répandu chez tous les Berbères et qui veut que pour avoir des songes prophétiques on aille se coucher sur les tombes des anciens. A Tamalarat on m'a montré un groupe de sépultures circulaires accolées de tombes plus petites, qui sont recherchées par ceux qui veulent voir l'avenir en rêve. Ce sont précisément les tombeaux des "*Nesran*" dont les Touareg prétendent descendre. Actuellement ils désignent sous ce nom, qui signifie Nazaréens, les Chrétiens ; mais jadis il s'appliquait probablement aux Juifs dont les colonies étaient fort prospères dans le Sahara.

L'usage d'élever des tas de pierres semble s'être maintenu non seulement pour les sépultures, mais aussi pour perpétuer certains événements, comme on l'a souvent noté chez d'autres Berbères. Ainsi sur un plateau de l'Aïr, entre Aoudéras et Assada, on voit une ligne de cairns de taille diverse, dont voici l'origine : à une époque assez récente, un grand marabout, Bilal el Bardaji, a été blessé à cet endroit, et à chaque endroit où son sang est tombé on a élevé un tas de pierres. Cet alignement se termine par une enceinte de pierres, basse, rectangulaire, longue de 50 mètres, large de 5 à 10 mètres : c'est son tombeau.

LES GRAVURES RUPESTRES.

Il y a déjà longtemps que l'on a décrit des gravures rupestres dans le Sahara Nord, mais celles de la partie Sud n'ont été que signalées par différents voyageurs comme E. de Bary, Nachtigal, Foureau, Chudeau, Cortier. La série que j'ai découverte dans l'Air est très étendue et présente des caractéristiques qui la distinguent de celles qui ont été trouvées plus au Nord. Voici en quoi elles consistent.¹

Les gravures sont obtenues par le procédé du martelage sur de grandes dalles généralement verticales, en roche dure situées dans des endroits élevés et sans orientation précise. Parfois, lorsque la roche est tendre, elles sont râclées et atteignent une grande profondeur. Les sujets traités sont les suivants : 1°—des inscriptions en caractères *Tifinar*, tracées avec soin et assez longues ; 2°—des représentations d'animaux traitées tantôt d'une façon très réaliste avec un sens réel des proportions et du mouvement, tantôt d'une façon tout à fait schématique à l'aide de quelques traits qui n'excluent pas la vérité. Les animaux représentés sont : le chameau, le cheval, le bœuf, l'âne, le phacochère, l'antilope, la girafe, l'autruche, la hyène, la gazelle, peut-être le chien et le serpent ; 3°—des représentations d'hommes, les unes schématiques, les autres réalistes. Parfois la silhouette humaine se réduit à une croix double ; parfois elle a été au contraire traitée avec beaucoup de détail et avec une recherche réelle des particularités du costume. C'est ainsi qu'on voit figurés des hommes vêtus de pantalons comme en portent les Touareg actuels, et d'autres avec des vêtements qui ne sont plus en usage. Les armes ne sont jamais reconnaissables avec certitude ; si certains traits peuvent être interprétés comme des lances, on ne voit jamais de hache, d'épée, ni de bouclier, rien du moins qui ressemble au vaste bouclier actuel des Touareg. Jamais on ne reconnaît les traits du visage, ni les seins, ni les attributs sexuels, ni les habitations, ni les ustensiles, ni les végétaux. A signaler comme très remarquable un dessin fort net représentant un squelette humain.

Les Touareg attribuent tous ces dessins à un géant appelé *Anegoura* qui les faisait pour passer son temps. Je les rapporterai plus volontiers à une race très analogue, sinon identique aux Touareg, se trouvant à un stade de culture comparable à celui qu'ils occupent aujourd'hui, et possédant probablement le fer. Ils connaissaient le chameau, dont l'introduction dans ces régions date des débuts de l'ère chrétienne, et semblent ignorer l'éléphant, qui s'éteignit à la même époque. Quant aux auteurs des gravures, c'étaient, selon moi, des bergers désœuvrés qui tuaient ainsi le temps en gardant leurs troupeaux ; aucune idée magique ne devrait donc y être cherchée.²

¹ Je les ai décrites en détail, avec figures, dans une mémoire intitulé : "Les gravures rupestres de l'Air," en *l'Anthropologie*, No. 2, 1913.

² L'archéologie de l'Air fera l'objet d'une publication séparée : j'indiquerai ici simplement l'existence de quelques gisements néolithiques dans les plaines : je n'ai rien trouvé dans la montagne, où j'ai relevé les gravures rupestres.

COSTUME.

Le costume des Touareg est trop connu pour que je m'y attarde beaucoup. Il se compose pour les hommes d'une vaste gandoura ou chemise sans manches, la *Tikamist*, en tissu aussi léger que possible ; un pantalon, *Kartebba*, ressemblant à celui des arabes et des noirs, mais moins ample et plus long ; il arrive toujours jusqu'à la cheville et depuis le genou il est à peu près cylindrique ; le voile de tête, *Taghelmoust*, long de 1 m. 50 environ, assez transparent, qui est enroulé très serré autour de la tête, et dont un pli recouvre le front et les yeux, tandis qu'un autre pli cache tout le bas de la figure jusqu'aux yeux. Parfois il se complique, dans l'Ouest, d'un turban blanc qui ne joue qu'un rôle décoratif. Des sandales de divers modèles complètent l'équipement des Touareg ; les unes sont en cuir de bœuf tanné, de couleur blanche ; l'extrémité se recourbe jusqu'à couvrir la moitié antérieure du pied ; des lacets en cuir passant entre le pouce et l'index, et sur le talon, l'empêchent de tomber. Un autre modèle, appelé généralement sandale haoussa, présente un dispositif un peu particulier. C'est une très vaste semelle, débordant le pied de tous côtés et maintenue par deux lanières qui partant des côtés viennent se croiser entre le pouce et l'index. C'est la chaussure idéale pour marcher dans le sable, à condition de poser le pied bien à plat et de le déplacer parallèlement au sol, en maintenant le membre inférieur en état de flexion et le haut du corps un peu penché. De cette manière l'on peut faire des pas très longs, sans enfoncer dans le sable.

Dans l'Aïr j'ai vu des captifs se servir de sandales tressées en feuilles de palmier, très rapidement faites et usées tout aussi vite, exactement pareilles à celles des Egyptiens anciens.

Enfin je dois signaler, surtout chez les Touareg de l'Ouest, Irrégouénaten et Tenguiriguifs, une haute ceinture en cuir recouvert de toile blanche, supportée par deux bretelles en cuir léger, souvent croisées sur la poitrine et sur le dos. Les extrémités de la ceinture se ferment à l'aide d'un boucle et d'un bouton. En Aïr, ces ceintures sont rares, elles ne sont pas recouvertes de toile, et le cuir en est décoré de dessins gaufrés. Elles ne serrent pas la taille, comme on pourrait l'imaginer, mais le bas de la cage thoracique, et les Touareg affirment s'en trouver bien pour les longues courses à chameau.

Le costume des femmes présente plus de simplicité encore que celui des hommes. Il se compose d'un pagne, généralement bleu foncé, en cotonnade, qui, enroulé autour de la taille, descend jusqu'aux pieds ; le haut du corps et la tête sont enveloppés d'un grand voile d'étoffe mince, dans lequel elles peuvent se cacher complètement si besoin est. Des sandales souvent très bien brodées complètent le costume. Dans l'Adrar des Iforas, les femmes se servent, paraît-il, d'un chapeau.

Dans la région de Tombouctou, on voit quelques femmes de vassaux ou de captifs porter une jupe en cuir ; elle a la forme d'une cloche, très serrée à la taille où la maintient un cordon de cuir ; elle moule absolument les hanches quand elle

a été portée quelque temps. Elle est ornée de dessins géométriques peints, gaufrés ou brodés, de franges, de pompons, de pendeloques diverses qui en font, quand elle est neuve, un vêtement superbe. Rien ne peut donner idée de l'impression que fait une de ces sveltes femmes brunes marchant au soleil dans un chatolement de couleurs vives, et dans un fouillis de lignes qui se déplacent sans cesse, pour composer au repos la plus harmonieuse des silhouettes. Ce genre de vêtement a d'ailleurs les plus grandes analogies avec la jupe à volants que portaient les femmes égéennes, et qu'on voit si bien dans la Prêtresse aux serpents et ses acolytes trouvées dans les ruines du palais de knossos.

ARMEMENT.

Les armes défensives des Touareg se réduisent à leur bouclier, *Arrer*, lequel est très grand, formé d'une peau d'antilope oryx (ou de bœuf), échancré en haut, et décoré en son milieu d'un dessin géométrique très compliqué, où l'on peut reconnaître un animal stylisé. Intérieurement une grande poignée métallique verticale permet de manier cette vaste surface ; ses extrémités, ressortant sur la face du bouclier, sont ornées de rivets plus ou moins ciselés et entourés de drap rouge.

Les Touareg n'ont jamais entendu parler ni de casques, ni de cuirasses, ni de cottes de maille. La lance est de deux sortes : l'*Allar*, faite d'une seule pièce, en fer, ornée d'applications en laiton ; la pointe est étroite, en feuille de laurier, ornée de deux barbelures. Une bague assez saillante permet de la tenir entre les doigts de pied pendant la marche à chameau. On ne la jette jamais. Les captifs portent la *Tarda*, dont le fer est très large, sans barbelures, la hampe en bois, et l'extrémité inférieure ornée d'un talon élargi en spatule. Dans l'Ouest on rencontre beaucoup de javelines, dont les fers ont des formes diverses et très horribles, étant donné les ingénieuses barbelures dont elles sont ornés, et qui empêchent leur extraction de la blessure. Elles ont aussi un organe très particulier qui figurait dans les anciens épieux de chasse européens, et qui se composait de deux courtes traverses empêchant une trop grande pénétration de l'arme ; dans les javelines, ces arrêts ne jouent qu'un rôle décoratif. Ce sont des armes terribles dans les mains des cavaliers, qui les lancent, au galop de leur cheval, avec une force et une précision incroyables. Je n'en ai vu que peu dans l'Est.

Au bras gauche les Touareg portent un long poignard de bras appelé *Téla*, ou *Gozma*, dont la gaine est fixée sur un solide bracelet où l'on passe l'avant-bras. La poignée est bizarre car elle comporte en son milieu une traverse qui lui donne l'aspect d'une croix et se place entre les doigts, ce qui est très gênant pour nos mains européennes, mais paraît commode aux Touareg.

L'arme principale du Touareg est l'épée, le *Tukouba* : longue, droite, le pommeau en disque bombé, la garde en forme de croix, la poignée très courte, elle évoque l'idée de l'épée des Romains, ou des premiers siècles du moyen âge. Elle a des analogies avec celle des Nubiens. Le Touareg attache la plus grande importance à

avoir une bonne épée, et n'hésite pas à la payer un prix que nous trouverions énorme. Je possède une épée, à lame européenne ancienne, dont le propriétaire avait refusé six chameaux, soit au moins mille francs. Depuis l'arrivée des Français, le prix des belles épées a dû baisser, car elles ne jouent plus qu'un rôle ornemental, tandis qu'autrefois le propriétaire d'une bonne lame était certain de regagner rapidement le prix qu'elle lui avait coûté, en pillant ses voisins. Il n'est pas rare de trouver des épées anciennes de fabrication européenne, avec des inscriptions espagnoles, et dont on fait le plus grand cas.

Inutile de dire que le fourreau de l'épée et du poignard reçoivent toute l'ornementation que peuvent leur donner les cordonniers indigènes, en cuir découpé à jour, coloré, gaufré : la bouterolle, la garde, le pommeau sont décorés de dessins géométriques, en repoussé et en ciselure. L'ornementation est bien plus riche dans l'Est que dans l'Ouest, où le fourreau est presque uni.

Je ne citerai que pour mémoire quelques armes à feu, généralement en mauvais état et toujours de fabrication européenne. Elles ne jouent qu'un rôle insignifiant. Les arcs et les flèches sont complètement inconnus.

BIJOUX.

Comme on peut s'y attendre, les bijoux jouent un certain rôle dans l'existence de ces grands enfants, mais ce sont surtout les femmes qui les portent. Les hommes se contentent de l'anneau de bras en schiste vert ou noir, *Abedj* ou *Azbik*,¹ de quelques bagues et d'amulettes.

Je prendrai comme type la bijouterie de l'Aïr, qui me paraît être la plus fixe dans ses traditions et la moins influencée par les races voisines ; elle est toujours en argent. (Pl. XXXVII.) Il y a trois types de bagues : le premier, *Maka*, est un cylindre d'argent avec un rebord en haut et en bas ; il est orné de triangles en pointillé ; il se porte au pouce. Le second, *Tasendour*, porté au doigt médium, présente un large chaton carré orné de quelques dessins géométriques : l'anneau se raccorde au chaton par un élargissement percé de trois trous et décoré de quelques lignes en creux. Enfin le *Kossédembou*, également porté au médium, a un large chaton rond, légèrement bombé, creux, qui fait l'office de grelot, parce qu'il contient une petite pierre mobile.

Les amulettes portées par les hommes sont généralement en cuir, mais les gens riches en portent en argent, d'un modèle très curieux. C'est un *Tchiro* carré de 6 cm. de côté, épais de 3 mm., orné de dessins géométriques repoussés, et terminé en bas par quatre petites pendeloques triangulaires en feuille d'argent, portant également des dessins au repoussé. En plus de celles-ci, pend un grand triangle, creux, *Tasembaou*, orné de dessins repoussés, et portant au bas sept pendeloques triangulaires avec dessins. Le tout s'attache à la grosse tresse qui part du sinciput des Touareg mâles, et pend sur leur nuque.

¹ J'ai décrit la fabrication de ces bracelets, dans *Le Bulletin de la Société d'Anthropologie de Paris*, 5 déc. 1912, "Objets de pierre polie de l'Aïr."

Ceux-ci ont d'ailleurs une autre amulette, le *Karambeski*, grand triangle équilatéral de 10 cm. de hauteur, dont la surface est décorée de dessins repoussés et de cabochons rapportés. Ces derniers sont montés sur des rondelles de drap rouge et de cuir vert qui les dépassent légèrement; deux forts anneaux latéraux servent à y fixer un cordon; on porte le *Karambeski* en bandoulière sur le côté.

A l'origine, ces divers objets contenaient des charmes plus ou moins orthodoxes; aujourd'hui ils n'ont qu'un rôle décoratif.

Les femmes sont mieux partagées. Elles ont d'abord des bracelets en argent creux, *Tkafat*, ornés de chevrons et de bordures perlées, d'un modèle très gracieux et dont elles portent au moins un exemplaire à chaque bras. Un collier d'argent, *Tchidofa*, dont les perles, travaillées au marteau, ont une section hexagonale, porte un ornement très particulier, un losange à côtés concaves, *Igourou*, traversé verticalement par un tube qui laisse passer la ficelle du collier; les pointes latérales sont en forme de toupies. L'extrémité du collier se divise en trois brins, de deux perles, portant chacun deux dés à douze faces. L'ensemble est d'un effet très décoratif.¹

Les femmes y ajoutent toujours deux *Tinérelé*, portées par un cordon spécial. Ces ornements dont la forme rappelle l'*Ankh* des Egyptiens, ont la forme de l'*Igourou*, mais plus complet. Ce sont des losanges à côtés concaves portant en haut un grand anneau de suspension, surmonté lui-même de deux petites pointes divergentes. Les trois pointes libres se terminent par des toupies. Une bordure hachée court tout autour du bijou, au centre duquel se voit un fleuron incisé.

Ce bijou ne se rencontre que chez les femmes Touareg de l'Aïr; partout ailleurs il est inconnu. Néanmoins je dois faire remarquer qu'il est très répandu, avec quelques variantes, chez les femmes haoussa, depuis le Niger jusqu'à Zinder. Je n'ai aucune opinion sur son origine, mais j'inclinerais à considérer ce bijou comme haoussa; il rappelle certaines figurations très anciennes de l'*Ankh* égyptien.

J'attribue la même origine à des bracelets de pied en torsade, ouverts terminés à chaque extrémité par un dé dodécaédrique, appelés *Elkazam*. Le même dispositif se retrouve en plus petit comme boucle d'oreille; il n'y a alors qu'un dé, l'autre extrémité étant conique; le poids de cet ornement déforme le lobe de l'oreille; on l'appelle *Tisebit* (pluriel *Tisabaten*).

Egalement haoussa, à ce que je crois, est une boucle d'oreille en argent portée à l'oreille droite par de jeunes garçons; c'est un cylindre ou un prisme terminé en haut par une boucle, en bas par un dé dodécaédrique. Elle est assez rare. J'en ai vu de pareils chez les Gallas d'Ethiopie.

OBJETS EN BOIS.

Le ménage d'un nomade se réduit en général, à peu de chose, et les Touareg ne font pas exception à cette règle. En dehors de la tente ou de la hutte

¹ Dans la Pl. XXXVI ce collier porte un médaillon carré, qui n'est en réalité utilisé que par les femmes haoussa.

démontable dont j'ai parlé, le Touareg possède surtout un assortiment d'ustensiles en bois, en cuir, ou en vannerie, qui ne varient guère d'un groupement à un autre.

C'est d'abord un mortier et son pilon ; généralement l'un et l'autre sont dénués d'ornementation, pourtant j'en ai rapporté de Tombouctou qui sont décorés de dessins géométriques incisés fort élégants. On ne les trouve que chez les gens aisés, l'usage du grain étant un luxe.

Bien plus répandus sont les vases en bois, de formes et de dimensions assez diverses, mais qui se rapportent à deux types ; la demi-sphère et le cylindre. Des anses sont souvent ménagées dans le bois, ou des mamelons percés pour la suspension. Leur ornementation est insignifiante ; quelques lignes incisées forment un décor géométrique primitif un peu maigre.

La Pl. XXXVII représente des *Tchibéné* de cuivre mince qu'on fixe en les repliant sur les bords des vases de bois, quand une fêlure s'y est produite ; elle ne peut dès lors s'agrandir ; on remarquera le décor géométrique très particulier.

La cuillère, *Amola* ou *Silkao*, se voit partout ; son type ne varie pas. C'est un vase conique, à section ogivale, pourvu d'un manche courbe qui s'élargit en spatule, et dont la convexité est dirigée vers le bas. Un décor géométrique gravé au fer chaud où l'on peut reconnaître un animal stylisé s'étend sur le vase ; le manche est orné de dessins très simples du même style.

Egalement en bois sont des entonnoirs, *Aseguefi*, indispensables pour remplir d'eau les peaux de bouc, et des abreuvoirs, sortes d'anges en bois léger, rectangulaires, peu profondes, et où l'on verse l'eau qu'on sort du puits pour la donner au bétail.

La *Tegwikant* est un ustensile assez singulier ; au sommet d'une tige en bois solide, grossièrement sculptée, viennent s'emmancher six minces baguettes qu'on replie extérieurement et dont les extrémités sont maintenues par un cercle de bois. L'ensemble peut se comparer à la corolle d'un liseron, et sert à supporter les vases remplis de lait, qui sont mis ainsi à l'abri des jeunes enfants et des animaux.

J'ai dit un mot plus haut des *Tagueïdeké*, qu'on appelle *Tiguittébé* dans l'Ouest. Ce sont des planches allongées, pointues en bas, découpées latéralement de diverses façons, que les Touareg nobles plantent à la tête et au pied de leur lit. Leur hauteur varie entre 0 m. 50 et 1 m. 50. Je suppose, sans en avoir de preuves, que ces objets représentaient à l'origine la branche de palmier, qui se dit *Tagueï* en touareg. On sait le rôle symbolique qu'elle jouait dans l'Afrique du Nord pendant l'antiquité. On en trouve encore diverses représentations, qui ont perdu leur sens mystique et n'ont plus qu'un rôle décoratif. Je crois qu'on peut placer les *Tagueïdeké* dans cette catégorie.

Le lit enfin joue un certain rôle dans la vie du Touareg, quoiqu'il n'y ait que les gens assez aisés qui en aient un. On le nomme *Tedoubout*. Il se compose de deux rondins de 1 m. 50 de longueur, en forme de pilons, c'est à dire renflés aux deux extrémités, et pourvus à espaces réguliers d'encoches sur lesquelles viennent se

placer des bâtons bien taillés, plus petits de diamètre, de longueur presque égale, et qui servent de support à une claie formée de minces baguettes fixées les unes aux autres par des liens de cuir. Sur le tout se placent des nattes et des peaux de mouton ou de chèvre. Bien que les Touareg soient de haute taille, leur lit, qui est presque carré, ne dépasse pas 1 m. 50 en longueur. Ils y dorment pelotonnés sur eux-mêmes, complètement enveloppés de leurs vêtements, et parfois de quelque couverture en cotonnade polychrome.

La hache se voit presque partout ; elle est du type dit hache plate, à fer étroit, sans talons et sans ailettes ; elle sert à abattre le bois de chauffage.

Le mobilier du Touareg se complète par des selles pour les chameaux et les chevaux. Ces objets ont été trop souvent décrits pour que j'y revienne. Je dirai seulement que l'on voit souvent des selles ornées avec un grand luxe de cuirs découpés et brodés et d'applications de métaux plus ou moins ciselés. On voit aussi des bâts très simples pour les chameaux qui font les transports ; leur modèle varie suivant les régions.

OBJETS EN CUIR.

Les objets en cuir dont se servent les Touareg sont peu nombreux, mais présentent un grand intérêt à cause du luxe d'ornementation qui les décore presque toujours.

Un groupe d'ustensiles servant à puiser et à transporter l'eau fait à cette règle une exception que l'on conçoit très aisément ; les services qu'ils fournissent rendraient inutile et même dangereuse une ornementation qui diminuerait certainement leur résistance. Il y a en premier lieu le seau en cuir qui sert à puiser l'eau dans des puits parfois très profonds ; c'est une poche de cuir soutenue par un cercle de bois sur lequel vient s'attacher une corde, généralement en cuir. La petite quantité d'eau, un à deux litres, que le seau tire à chaque fois est versée dans un abreuvoir en cuir ou en bois quand elle doit être consommée immédiatement par les animaux. J'ai parlé de l'abreuvoir en bois ; celui de cuir, plus répandu dans l'Ouest, se compose d'une poche en peau de chèvre à qui une carcasse en baguettes donne la forme circulaire. Il peut contenir cinquante à soixante litres d'eau. Lorsque l'eau ne doit pas être bue immédiatement, elle est emmagasinée dans des outres en peau de chèvre, soigneusement tannée, contenant vingt-cinq litres environ et qui sont d'un transport facile. Souvent elles sont frottées de corps gras pour éviter une trop rapide putréfaction.

Quand il s'agit de transporter du riz ou du grain, on se sert de vastes outres faites d'une peau de bouc épaisse, qui peut atteindre de grandes dimensions et contenir cent kilos de grains.

S'il s'agit de vêtements, on prend des peaux de chèvre bien tannées, souvent même mégies, et qui reçoivent une décoration spéciale ; au milieu, on coud un morceau de cuir circulaire, décoré de dessins géométriques ciselés ou peints, de broderies faites avec de minces lanières de cuir blanc, et d'applications de cuirs de

différentes couleurs. Les extrémités du sac reçoivent une ornementation analogue, mais on n'y voit plus de broderies, jugées sans doute trop fragiles. Le cou de la bête constitue la seule ouverture, et se plie de façon à pouvoir être enserré dans une lanière assez forte qu'on peut fermer à l'aide d'un cadenas. Des franges, des pompons, des pendeloques diverses viennent augmenter la somptuosité de cet objet qui produit au soleil un effet admirable.

Les coussins sont assez nombreux sinon très confortables. Les uns sont en forme de rectangle allongé, dont les extrémités sont seules décorées, le milieu gardant la couleur naturelle du cuir. D'autres sont circulaires, formés de secteurs de couleurs vives, où dominant le rouge et le jaune ; en ce cas, il n'y a pas de dessins.

Un objet qui accompagne presque toujours le Touareg aisé sur son chameau est la sacoche qui pend sur le flanc droit de l'animal et où il met provisions et vêtements de rechange, quand il en a. Son rôle est surtout décoratif. De forme carrée, ayant environ 40 cm. de haut, la sacoche est fermée par une large patte de recouvrement, sur laquelle le goût ornemental des artistes s'est donné libre cours : tout ce que le style géométrique peut donner comme motifs d'ornementation a été employé ici, et l'effet produit est absolument remarquable.

On fait des saches plus petites, portées en sautoir, pour contenir les munitions, les papiers, mais elles sont peu répandues ; il y a de même des peaux de bouc de dimensions restreintes et bien décorées qui servent à porter du tabac ou des provisions de bouche qu'on tient à avoir à portée de la main.

Le tabac à chiquer, dont un Touareg se passe très difficilement, est contenu dans un porte-monnaie d'un type très particulier, et universellement adopté chez les Touareg, les Noirs, et dans tout le Soudan. C'est un sac en cuir noir *Inefed*, rectangulaire, composé de diverses poches, ayant chacune une petite patte de rabattement, de couleur et de dessin différents, et très soignées. Il est suspendu à des cordons sur lesquels coulisse une sorte d'étui, également très orné et qui vient recouvrir le tout. Le contenu du portemonnaie est donc à l'abri de la poussière et ne peut tomber par accident. Les cordons sont par contre un peu frêles et se brisent souvent. Il existe de ce portemonnaie des variétés assez nombreuses, de taille et d'ornementation assez diverses, mais dérivant toutes du même principe de recouvrement.

Les amulettes que les Touareg portent sur eux en quantité prodigieuse sont en forme de carré ou de rectangle, cousues dans du cuir ; certaines, triangulaires, sont fixées aux tresses qui partent du sommet de la tête chez les hommes : leur nom est *Tchiro*, de même que certains bijoux d'argent.

Tout ces objets sont en général bien plus ornés et bien plus beaux à mesure qu'on va vers l'Est ; peut-être est-ce dû à l'influence des Haoussa, mais il est certain que dans l'Ouest l'ornementation est plus simple et bien moins soignée, les couleurs en usage moins variées et moins riches, et la broderie rarement employée.

Il est une catégorie d'objets en cuir que l'on rencontre dans tout le Soudan, chez les Maures, chez les Touareg, mais qui trouve son développement le plus

complet, sa perfection, peut-on dire, chez les Touareg de l'Air. Je veux parler des boîtes en cuir moulé *Al bāsa*, qui présentent diverses particularités intéressantes. Leur forme, dans l'Ouest, est celle d'un cylindre aplati, avec un couvercle emboîtant et une décoration géométrique rouge clair ; dans l'Est au contraire, la décoration, toujours géométrique, est rouge foncé, et le couvercle, beaucoup plus haut que la boîte, a une section ogivale ; le tout ressemble un peu à un obus. L'ornementation, d'une grande richesse, et d'un bel effet décoratif, se détache en rouge foncé sur le fond de la boîte qui est d'un jaune clair et transparent. Les femmes touareg s'en servent comme de coffrets à bijoux, tandis que les boîtes plates de l'Ouest servent à mettre le tabac à priser.

Quant à leur confection, elle est très particulière ; on fabrique un moule en terre de la forme désirée, sur lequel on applique des lanières de peau qui ont longuement trempé dans l'eau, et qui ont été soigneusement raclées.

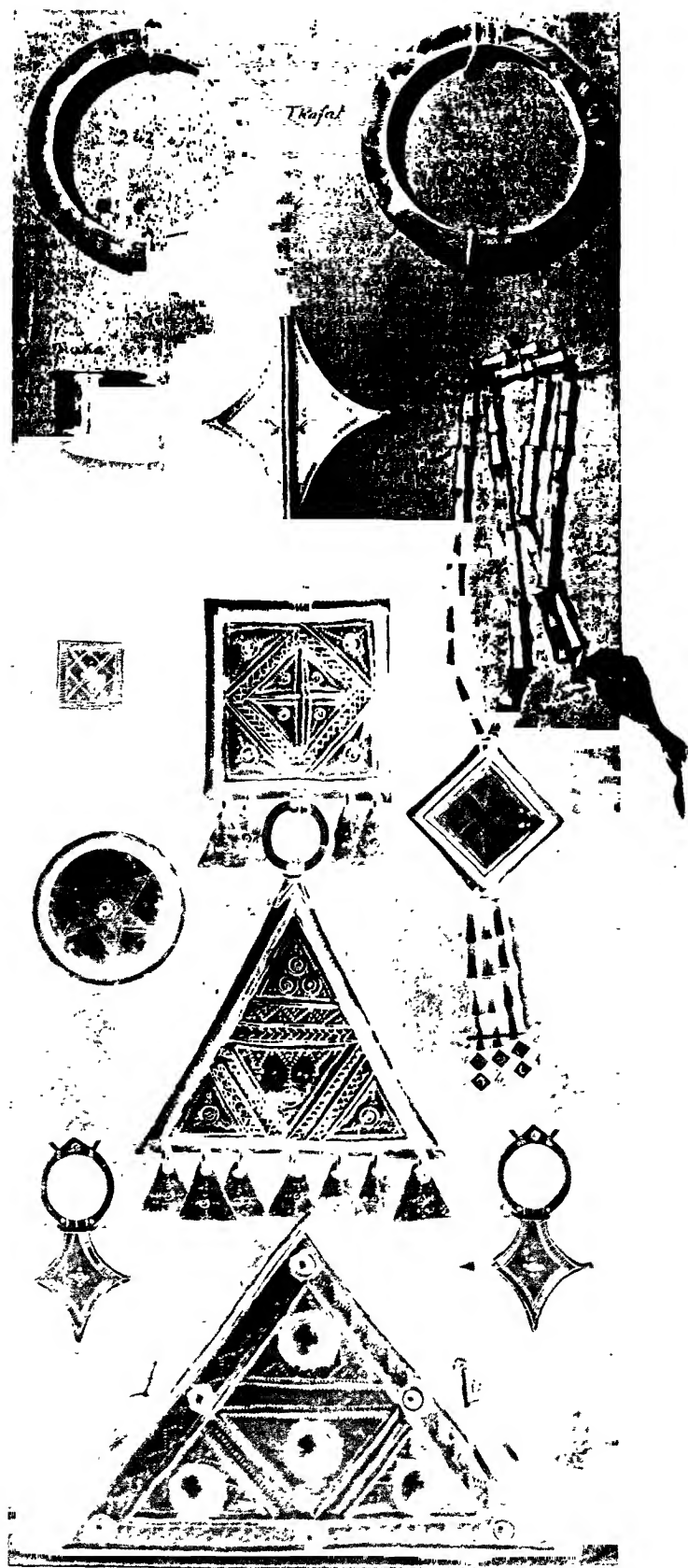
On obtient ainsi successivement sur le même moule le fond et le couvercle ; quand ils sont secs tous deux, on brise le moule et on décore la boîte de dessins très élégants et très sobres par le procédé de la *réserve* ; on recouvre de cire les endroits qu'on ne veut pas voir colorés et sur le reste on répand une teinture végétale brune. Après dessiccation, on enlève la cire et les dessins apparaissent en jaune sur fond rouge.

On fabrique par le même procédé des bouteilles en cuir très pratiques pour le transport du beurre, qui est, on l'imagine bien, presque toujours à l'état liquide.

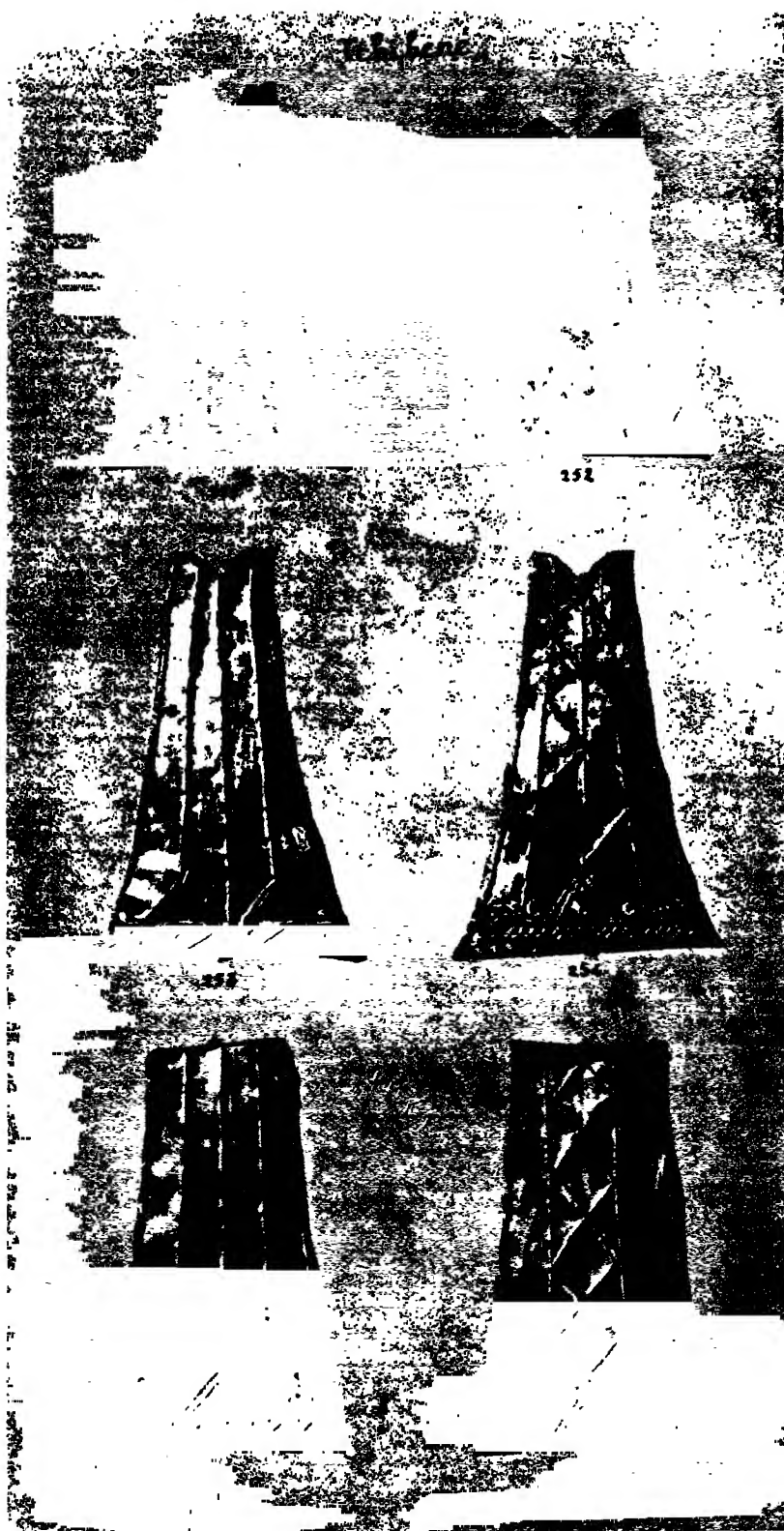
OBJETS EN VANNERIE.

La solidité particulière des objets en vannerie et leur prix de revient peu élevé expliquent l'usage que les nomades en font. En première ligne il faut citer les paniers divers fabriqués en fibre d'aloès et qui servent à contenir des grains ou de menus objets. Les uns sont sphériques, avec un couvercle rentrant, et souvent des courroies qui servent à les renforcer. D'autres sont hémisphériques, ou en forme de tronc de cône renversé, ils sont parfois cousus dans du cuir, décoré de dessins géométriques et mêmes de cauris appliqués. D'autres enfin, très légèrement concaves, servent de couvercles pour les récipients plus grands, ou de blutoirs pour nettoyer la farine quand elle a été pilée. En général, ils sont ornés de dessins géométriques très larges et bien appropriés à leur forme. Un grand nombre de ces paniers sont fabriqués en pays haoussa, mais il en est que les femmes des forgerons attachés aux tribus touareg font elles-mêmes.

Ce sont elles aussi qui fabriquent ces nattes dont j'ai parlé plus haut et dont les Touareg, comme d'ailleurs les Maures et les Nègres, font une grande consommation. Il faut distinguer celles qui sont faites avec le limbe des feuilles de palmier tressées de diverses manières, et celles qui sont construites comme des stores, c'est à dire que les tiges de graminées qui les composent sont placées parallèlement les unes à côté des autres et maintenues par de fines lanières de cuir. Celles-ci sont disposées avec régularité de façon à faire des dessins parfois très élégants. Lorsqu'elles



LA BIJOUTERIE DE L'AÏR : TYPES DE BAGUES ET D'AMULETTES.



TCHIBÉNÉ DE CUIVRE (p. 371).

sont de grande longueur, on les place debout autour de la hutte ou de la tente et on obtient ainsi un paravent des plus pratiques contre le vent et les regards indiscrets. Leur prix atteint jusqu'à 250 fr., tandis que les premières, plus modestes et plus faciles à faire, valent 0 fr. 50 et 1 fr. pièce.

CALEBASSES ET CÉRAMIQUE.

Les Touareg transportent avec eux quelques pots en terre *tein* qui servent à faire cuire les aliments, mais ils sont toujours fabriqués dans les villages haoussas circonvoisins. Leur fragilité et leur durée beaucoup moins grande que celle des ustensiles de bois limite un peu leur usage. D'ailleurs il n'y a que les Touareg aisés qui puissent se permettre de manger du riz ou des céréales, et par conséquent qui aient besoin de vases allant au feu.

Il en est de même des calebasses ; c'est seulement au contact des noirs que les Touareg se servent de ces récipients commodes et légers, mais dont la solidité laisse à désirer. Inutile de dire que leur pays n'en produit pas. Celles qu'on voit chez eux sont souvent ornées de dessins gravés au fer chaud, très élégants.

* * * * *

En terminant cette étude, il est légitime de se demander, en manière de conclusion, quel est l'avenir qui attend le Touareg. Le problème est délicat. Il est des races dont on peut dire qu'elles évolueront dans un sens quelconque, mais qui oserait en dire autant du Touareg ? On chercherait vainement un type humain plus étroitement adapté à son milieu et à son genre de vie, et par conséquent moins assimilable. Si d'un côté on peut dire que c'est son âpre et sauvage patrie qui a créé cette race énergique, sobre et brave, on peut affirmer avec autant de certitude que c'est son âme puérile, cupide, vaniteuse et changeante qui a créé cette organisation médiévale et anarchique où elle vit et dont elle meurt. Il semble qu'il y ait toutefois place pour une sorte de compromis.

Aujourd'hui, grâce à la paix que font régner les troupes méharistes, il ne peut continuer l'antique tradition de batailles et de pillages, mais il peut toujours mener la vie indépendante et large du nomade. Il aura toujours quelques convois de marchandises à transporter sur ses chameaux à travers le désert, mais il se confinera surtout dans son rôle d'éleveur et il alimentera de bétail les pays voisins, peuplés surtout de nègres cultivateurs. C'est déjà ce qui se passe dans certaines régions entre le Niger et le Tchad, où les Touareg sont à demi-sédentaires, les jeunes gens nomadisant avec les troupeaux dans la brousse, les hommes, les vieillards, les femmes, les enfants vivant dans des villages, parmi des Haoussa auxquels ils se mêlent ; leurs anciens captifs, devenus leurs clients, font de la culture dont ils profitent.

Les Touareg du désert, au contraire, n'ont presque pas de terrains cultivables ; leurs captifs sont en voie d'extinction et ne pourront être renouvelés ; ils seront donc obligés de se consacrer à l'élevage et par conséquent pourront garder en grande partie le genre de vie qui leur a constitué une originalité aussi forte et une physionomie aussi tranchée.

FLINT-FINDS IN CONNECTION WITH SAND.

BY REGINALD A. SMITH, F.S.A.

A FEW recent discoveries, that perhaps have nothing in common but their connection with sand, seem to be worth collecting, as their significance may be under-estimated by those who see one or other of them in various periodicals, some of which are not easily accessible. There being no other necessary connection between these flint-finds, it would be easy to put down to a series of accidents their presence in sand; but apart from sand-hills in certain localities, it seems that the natural agencies that were responsible for the sand (and other deposits possibly allied to it) are no longer in operation, and the problem is to determine when their work was accomplished and, by implication, the date or dates of the included human relics.

In June 1913 a generous grant from the Percy Sladen Memorial Fund enabled me to conduct excavations on a site that has become famous through Mr. Reid Moir's discoveries below the Crag, but has also added to his collection a number of peculiar flints from another horizon, which are now deposited in Ipswich Museum. With the kind co-operation of himself and Mr. Dewey of H.M. Geological Survey, I made a systematic examination of the site from which many worked flints had been already recovered, a black band being exposed some four feet from the surface, near the path on the north side of Messrs. Bolton and Laughlin's brickyard just outside Ipswich (Fig. 1). An account of the supposed "floor" at that spot has been published by Mr. Reid Moir in the *Ipswich Field Club Journal*, 1913, from which some of the following details are quoted. The surface of this part of the brickyard has been somewhat disturbed, and the path just above it probably altered the level, but the lower part was undisturbed. The section bared was as follows:—

Turf and soil (probably moved).

Sand, 3 feet.

Carbonaceous sand, wet, with numerous "pot-boilers," 1 foot 7 inches.

Dry yellow sand, 7 feet from surface and (close by) 5 feet deep, over London Clay.

The black band stopped on the east side of our trench, but extended for at least 25 feet, and may be regarded as an ancient hearth, on which flints had been heated and then plunged into water. Practically nothing but these crackled flints

came to light on that occasion, and pits were dug at 13 other spots, the sections being fairly uniform as follows:—

Turf and minimum of soil.

Pure sand, about 3 feet thick.

Hearth or "floor" from 6 to 12 inches thick, with burnt flints, flakes, etc., or horizon marked only by coffee-coloured stain.

Yellow sandy loam, 2-4 feet thick.

London Clay, at about 7 feet from surface.

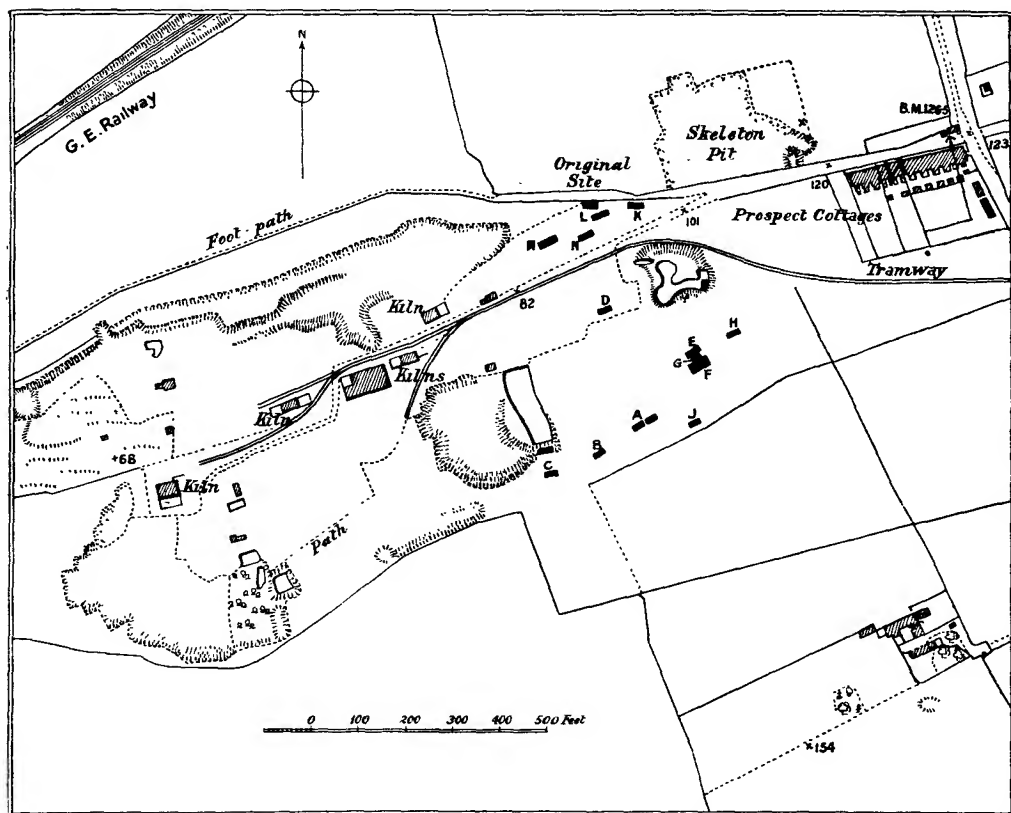


FIG. 1.—PLAN OF MESSRS. BOLTON AND LAUGHLIN'S PIT NORTH OF IPSWICH, SHOWING TRIAL-PITS (A-N) DUG IN 1913.

By joining pits E, F and G a large hearth was discovered, the bottom sloping with the hill (about 1 in 4) and extending over about 200 square feet. It was oval in outline, 20 feet north and south (on the slope) and 11 feet wide through the middle. It was 1 foot thick in the centre, and $1\frac{1}{2}$ - $2\frac{1}{2}$ feet below the surface, being covered with grey sand and resting on white sand. Pit J was dug close below the hedge which marks a feature, the site being approximately level with the original hearth on the opposite side of the valley; but the pit showed no signs of a "floor," only $2\frac{1}{2}$ feet of grey sand above caked yellow sand entirely free of stones.

In the centre of the valley (pit D) there was no trace of a "floor," but merely

pebbles, quartz and other stones at 4 feet from the surface below pure sand; but a little further east, up the valley, a section was cut on the edge of the pond, and the floor-level found at about 2 feet. Above it was dark sand; and below, about 4 feet of loamy sand resting on London Clay. Mr. Dewey suggests that the "floor" once extended across the valley but has been washed away by a water-course at some remote date, there being no stream at the present day.

Though the flints and other remains found during these excavations were of little evidential value and indeed insignificant, it was a satisfaction to establish an occupation level practically all over this part of the brickyard, which had been buried at some date under 3 feet of pure, almost impalpable sand. If the deposit is merely hill-wash, it is curious that so few pebbles or other stones were included in it either above or below the floor. In such a case any evidence from the flints and other finds would be welcome, and the series collected by Mr. Reid Moir on the most prolific site do indeed present a homogeneous appearance. They are nearly all brownish-black, quite fresh and sharp, uniformly small and stumpy with parallel flaking on the worked parts; and permission has been freely granted for the reproduction of several specimens (Figs. 2-7). The rarity of patina is not a



FIG. 2.—THIN IMPLEMENT, FRONT AND BACK VIEWS : IPSWICH ($\frac{2}{3}$).

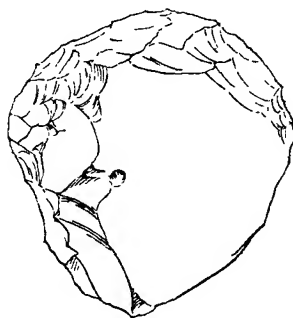


FIG. 3.—STEEP ROUND-SCRAPER, FRONT AND SIDE VIEWS : IPSWICH ($\frac{2}{3}$).

serious difficulty, as the oldest French cave series, from Le Moustier cavern, is normally unchanged; and the only known dated industry that is at all similar is the Aurignac series of the palæolithic cave-period of France. The resemblance may be deceptive and such peculiar forms may conceivably belong to another or to several stages of the Stone Age; but at present we must either regard them as undatable or connect them with the Aurignac culture which is known to be represented in this country (as at Paviland Cave and Wookey Hole). As there are no caves near Ipswich, prehistoric man must either have avoided the neighbourhood altogether or left his remains on or near the surface. Geological research may determine whether the layer of sand is the gradual accumulation of centuries or a deposit assignable to one period and to particular circumstances.

Another investigation of considerably greater importance, but perhaps of less interest in England, has been conducted by an eminent geologist, who has been criticised, as was natural, but maintains his ground and persists in what the

orthodox archæologist is only too ready to denounce as heresy. I do not pretend to any knowledge of the geology of Schleswig-Holstein or any other region, and it

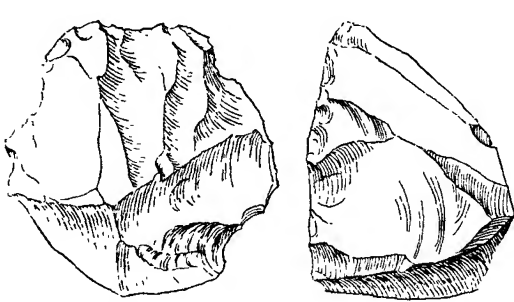


FIG. 4.—CONE WITH SQUARED NOSE, TOP AND SIDE VIEWS: IPSWICH ($\frac{2}{3}$).

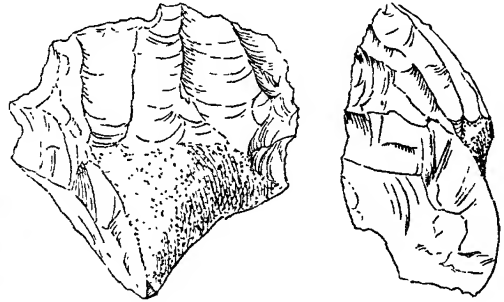


FIG. 5.—SUB-CONICAL STEEP-NOSED SCRAPER, TOP AND SIDE VIEWS: IPSWICH ($\frac{2}{3}$).

is fortunate that the alleged facts not only speak for themselves but have attracted the attention of other competent observers, so that a settlement of the question cannot be long delayed.

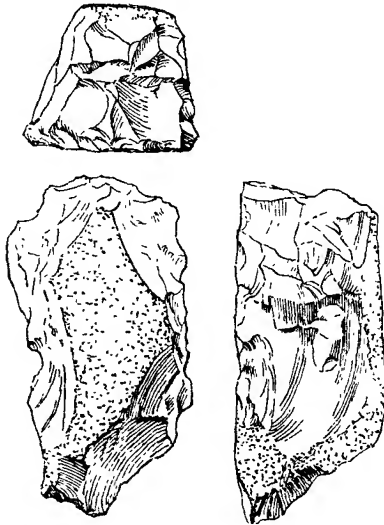


FIG. 6.—PLANE WITH STEEP END AND SIDES; END, TOP AND SIDE VIEWS: IPSWICH ($\frac{2}{3}$).

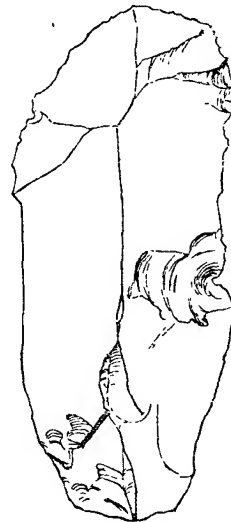


FIG. 7.—RIDGED BLADE WITH SOME FLUTING: IPSWICH ($\frac{2}{3}$).

In May, 1911, Professor Dr. C. Gagel reported to the German Geological Society¹ on what he called, with some hesitation, early neolithic finds in the later glacial deposits of West Holstein; and suggested some modification of prevalent views as to the postglacial date of certain so-called neolithic implements. In a railway gravel pit at St. Michaelisdonn, west of the southern end of the Kiel Canal and about six miles north of the mouth of the Elbe, worked flints have been found in some quantity in the *Geschiebedecksand* (glacial sand over boulder clay) or

¹ *Zeitschrift, B. Monatsberichte*, No. 5, 1911, p. 249; and *ibid.*, No. 12, p. 620.

upper Drift deposit of that region. The section was as follows, in descending order:—

1. Fine-grained, black *Heidesand* with *Dreikanter* (stones worn into facets by blown sand) at the base 1-1½ feet.
2. Unstratified brownish yellow *Geschiebedecksand*, slightly loamy in places, smaller pebbles in upper part and larger pebbles below 1½-2½ feet.
3. Irregularly stratified, light-coloured sand, without stones, but with bank of brown sandy *Geschiebelehm* (boulder-clay) 0-6½ feet.
4. Morainic bank (*oberer Geschiebemergel* ?) 4 feet.

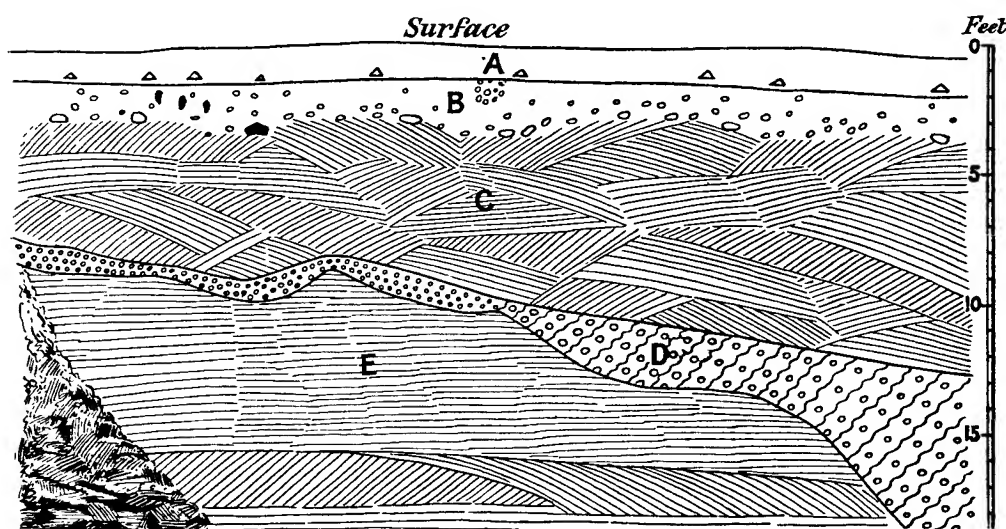


FIG. 8.—FIRST SECTION AT ST. MICHAELISDONN (AFTER GAGEL, APRIL, 1911).

A.—Black heath-sand with *Dreikanter*.

B.—Glacial sand with pebbles and worked flints in upper part.

C.—Current-bedded sand.

D.—Boulder clay.

E.—Moraine bank, with fallen material on left in which some flints were found.

Worked flints were found about 1½ feet below the junction of beds 1 and 2, including some with white patina; and the same association occurred at the base of the *Geschiebedecksand* (bed 2), above the false-bedded sand. The flakes and implements figured show no resemblance to Drift forms, and the best specimen is like a short Thames pick, the type usually associated with the transverse axe (*tranchet*, *Skivespalter*) of the Danish middens and earlier sites, such as Maglemose. The flints were nearly all quite sharp and had evidently not been rolled to any appreciable extent, the conclusion being that they were chipped on the spot by men who sought their raw material among the flints washed out of a moraine on the

melting of the glacier. It was clear that the flints got into their sand-bed before the black upper sand was deposited on a band of wind-polished stones. Various objections to this interpretation of the section were discussed by Professor Gagel, who suggested on a subsequent occasion¹ the following sequence of events :—

1. Ground-moraine of the principal glaciation (lower zone).
2. Fresh, unweathered intermediate deposits with undoubted palæolithic implements.
3. Undoubted ground-moraine of the principal glaciation (upper zone).
4. Interglacial weathered zone in old Drift gravel also with palæolithic implements.
5. Interglacial peat, with plants typical of the last interglacial period but now extinct in Europe ; also oak, ash and other trees, with palæolithic implements and signs of a warm climate.
6. Undoubted deposits of the last glaciation (sandy ground-moraine with large boulders).

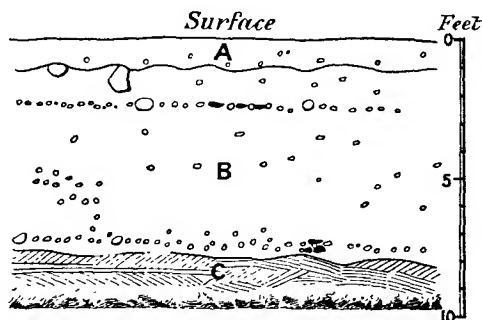


FIG. 9.—SECOND SECTION AT ST. MICHAELISDONN (AFTER GAGEL, SEPTEMBER, 1911).

A.—Black heath-sand.

B.—Glacial sand, with two pebble layers in which worked flints were found, and boulder (perhaps not *in situ*) at the top.

C.—Current-bedded sand.

The late Professor Koken noticed this find in *Die diluviale Vorzeit Deutschlands*, a sumptuous work written in association with R.R. Schmidt and Schliz. Translated, the passage reads (p. 215) :—“ Still more surprising than the occurrence of eoliths in very old Drift beds is the announcement of worked flints regarded as neolithic in glacial sand (Geschiebesand), where, to judge from south German finds, one would expect Le Moustier types. Gagel assigned his series from this deposit in West Holstein to the neolithic period. One knife, figured in his paper, suggests the neolithic blades found in the sand-dunes near Brunswick. The description does not preclude the possibility that they came, not from the glacial sand, but from the alluvial heath-sand, for they were picked up off fallen material, and only a few (not figured) came direct from the undisturbed strata. Gagel recently supplemented

¹ *Zeitschrift für Ethnologie*, 1913, 155.

his communication and insisted that the original position of the flints in the glacial sand and their attribution to the climax of the last northern glaciation were beyond all doubt. The specimen figured is, on the other hand, neolithic. He contends that the layer of worked flints belongs to the glacial sand, and it is open to question whether the sand was due to the last or the last but one glaciation. If Gage were right in supposing that traces of mesolithic man have been found *in situ* in an undoubted glacial deposit, we should be confronted with a very difficult problem."

To return to England, reference may next be made to a brief report presented to the East Anglian Prehistoric Society, from which I freely quote.

In the spring of 1913 an interesting discovery was made about a mile north of Icklingham, in the north-west corner of Suffolk. The site is about 160 ft. O.D., on the edge of a sandy plateau which forms the continuation of the Boulder-clay area and is the last high ground towards the Fens. The ground was being trenched two spades deep at the head of a short dry valley sloping southward to the Lark, and in places the broken surface of the chalk was found below the sand at about 18 inches from the surface, though elsewhere the sand was 4 feet or more in thickness. Dr. Allen Sturge subsequently made investigations, and had special trial-holes sunk to the chalk in view of the discovery by the workmen of a working-floor of the Stone Age, with flint flakes and implements to the number of two hundred, together with charcoal from hearths. According to his report in the *Proceedings of the Prehistoric Society of East Anglia*, vol. i, part iii, p. 292, the majority were patinated on one face only, and the rest were patinated unequally on the two faces; all were without scratches, lustre, or iron-moulding, in marked contrast to the multitude of surface-flints collected on the sloping ground immediately south of the "floor." The floor-pieces have a dead white patina, and are expressly compared with the series from Grime's Graves, those prehistoric flint-mines being about 11 miles north of the present site, in a very similar position with regard to the Boulder-clay plateau, the Fens and the river. Dr. Sturge remarks on the strange fact that three of the implements might, so far as their shape goes, have come from palæolithic gravels, and gives photographs of both faces in each case. "One is a large ovate-lanceolate implement 9 inches long, recalling the *limande* of the St. Acheul deposits; another is a pointed implement with thick butt, $5\frac{1}{2}$ inches long, showing a close resemblance to well-known gravel types; and the third is a pointed ovate, $3\frac{1}{2}$ inches long, of a pattern practically identical with those from the Warren Hill gravels. With these three lay a chipped celt with parallel sides, of the type so familiar as coming from Cissbury." Flakes and implements evidently belonging to the same culture have been collected not only on the sites mentioned, but also elsewhere in East Anglia; and in Dr. Sturge's opinion resemble Drift and neolithic forms, rather than those of the Cave period. They are, however, all of the same date and origin, and include no examples of polish. Another link between the Icklingham floor, Grime's Graves, and Cissbury is the occurrence at all three places of large flint blocks weighing up to 3 or 4 lbs., more or less circular and

roughly chipped; and with all deference to Dr. Sturge, I cannot help regarding this recent discovery as a strong argument for the palæolithic date of Cissbury and Grime's Graves, as already suggested in *Archæologia*, lxiii, 108 (May, 1912). Mention is made in that paper of the geological aspect of Grime's Graves, inasmuch as Canon Greenwell had to penetrate 13 feet of dark yellow sand before he came to the solid chalk in which the prehistoric shaft had been sunk.¹ Icklingham produces the same kind of worked flints under sand, which must have been deposited after the flints were chipped and (according to Dr. Sturge) before the surface-flints on the slope were manufactured, the latter being heavily scratched in thousands of cases. The pall of sand is referred by him to a desert period between the two flint periods or groups of periods.

Two chipped celts of particularly symmetrical form may be mentioned as having been found under exceptional conditions. One is in Mr. W. M. Newton's collection at Dartford, and was found on the north side of Dartford Heath under 3 feet of sand. The patina is grey, and the length 6-7 inches. The other was found at the entrance of the N.W. Cave, Gop, Cheshire, under 2 feet of cave-earth,² and is figured in Mr. Glenn's account of recent excavations there. It might be objected that cave-earth is not sand, and the deposit had slipped or silted over a neolithic implement; but when several more finds of this kind have been put on record, the question will arise whether these human relics may not after all be *in situ*, as silent witnesses of geological phenomena in the early history of the race.

Having hitherto kept almost exclusively to sand-deposits, I may be allowed to allude to a cognate subject, the Rhine loess, usually considered of aeolian origin, and the human industries found in its various strata. The subject is highly controversial,³ but most investigators would agree that the beds at Achenheim, for example, were laid down over a long period, beginning with the late Drift (St. Acheul period) and ending with Aurignac, about the middle of the Cave period. It rests mainly with geologists to determine whether there was any corresponding deposit in this country; and in view of the close agreement between the Thames and Somme deposits (the latter having two strata called loess by Professor Commont), there is every prospect of linking up our pleistocene deposits with the Continent. In fact Mr. Clement Reid has for some time thought that the loess was represented by certain deposits on the Downs, but sufficient archaeological evidence has not been accumulated to prove his contention.

Though the Rhine loess is still under discussion and is indeed a burning question, certain facts connected with it are established, and agree with the evidence at present available on the Danube. At Hundsteig, Krems, 40 miles above Vienna,

¹ This statement must be modified in view of recent excavations at Grime's Graves. The sand measured by the Canon seems to have included part of the filling.

² A few words on cave-earth, loess and other deposits possibly related may be found in *Archæologia*, lxiii, 143.

³ References in R. R. Schmidt's *Diluviale Vorzeit Deutschlands*, pp. 64, 170, 195. The Austrian loess is said to date almost exclusively from Aurignac times.

a rich Aurignac industry was collected in loess 40 feet thick, and the account by Strobl and Obermaier¹ includes nine plates of worked flints that give an excellent idea of the Aurignac facies.

The principal sites on the Rhine besides Achenheim in Alsace, west of Strasburg (R. R. Schmidt, *Die diluviale Vorzeit Deutschlands*, 63, 195) are Munzingen (Freiburg-im-Breisgau, west of the Black Forest; Schmidt, pp. 67 and 200) and Metternich (on the Mosel near Coblenz; Schmidt, p. 86). Divergent views on the relation of these deposits to the principal glaciations have been published by F. Wieggers (*Prähistorische Zeitschrift*, i (1909), 16) and Dr. Bayer (*Jahrbuch für Altertumskunde*, iii, 149; iv, 154, and *Zeitschrift für Ethnologie*, 1912, pp. 1, 180; scheme reproduced in *Archæologia*, lxiii, 143). Whatever the ultimate decision on that point, it is clear that the loess was laid down about the middle of the palæolithic Cave period; and though we can point to no such gigantic deposits in England, it is most unlikely that the culture is not fully represented at least in south-east England. Once more Aurignac man is shown to have lived in the open as well as in caves, a fact that cannot be emphasized too strongly at the present juncture.

Further afield important finds in sand, practically identical with European palæolithic forms, have been recorded in Tunis, Egypt and Somaliland, but a more obvious explanation of the sand deposit is available in these cases. In England collectors have been busy on sandy stretches in Surrey, such as Blackdown (near Haslemere),² and Blackheath (south of Chilworth), but the flints have not been fully described and are difficult to date.³ There is a family likeness observable, and some significant steep fluting on conical lumps, but no corroborative details as in the caves, where the explorer's task is comparatively easy. On the sites just mentioned there is an outcrop of sand, and their interest lies solely in the flints discovered, but cases have been quoted where the deposit was later than the human occupation. Whether the sand is an important element in the matter of dating, careful geological examination can alone decide; its presence on some sites is at any rate not readily intelligible to the archæologist.

In conclusion, I can only express the hope that collectors will assist in solving such problems as I have outlined above by supplying the geologist with accurate archæological evidence as a substitute for the natural fossils that are in most cases altogether wanting. Finds on the surface may be and often are extremely interesting, but for scientific purposes cannot compare with flints sometimes lying a few inches below it.

¹ *Jahrbuch für Altertumskunde*, iii (1909), 129.

² Mr. E. W. Swanton, who is in charge of the find at Haslemere Museum, informs me that they occur below 4 in. of peat on the Hythe beds at 900 feet O.D.

³ Since this paper was read, a fine series of Aurignac types has been collected from a "floor" under sand in Surrey, a close parallel being thus provided for Mr. Reid Moir's discovery of Cave types at Ipswich.

SOME RECENT WORK ON LATER QUATERNARY GEOLOGY AND
ANTHROPOLOGY, WITH ITS BEARING ON THE QUESTION
OF "PRE-BOULDER-CLAY MAN."

By A. IRVING, D.Sc. and B.A.

(Abstract of a Paper read on May 6th, 1913.)

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I.—INTRODUCTION.

THE present paper was offered (in the first instance) as a continuation of the records of discoveries which had been already brought before the Anthropological Section of the British Association.¹ They add their evidence to that so far published of the abundance of mammalian life on the open steppe-country of those Tamisian uplands in later-glacial and post-glacial times; and geologically they seem to throw light upon the sequence of prehistoric events in the basin of the Orwell, in particular upon the *locale* of the "Ipswich Man," about which there has been of late much interesting discussion among geologists and anthropologists. In this connection one may fairly include the whole of the region formerly drained into the ancient Rhine estuary as within the Tamisian area in the wider physiographical sense of the term, since it presents us with a similar set

¹ See *B. A. Report* for 1910 (pp. 616 and 736), Sheffield meeting; *B. A. Report* for 1911 (pp. 131 ff. and pp. 521-2), Portsmouth meeting; to which add *B. A. Report* for 1913 (pp. 534-5, Section D; pp. 650-1, Section H), Birmingham meeting.

of physical conditions during the Quaternary Period, beyond which we have no valid evidence as yet for extending the interest of the anthropologist as such.

[On April 8th, 1913, the author gave a lecture at St. Albans on "Recent Discoveries of Prehistoric Horse Remains in the Valley of the Stort." A summary of that lecture with a half-tone reproduction of the photograph of the Stortford skeleton (*Illustrated London News*, June 5th, 1909) is published in the *Transactions of the Hertfordshire Natural History Society*, vol. xv, part 3, 1914 (pp. 177-181).

A "supplementary note" to that summary (*op. cit.*, p. 180) contains a brief review of the work done and published in the last three or four years, most of which has a bearing (more or less direct) upon the subject of the present paper full references being given.

On Saturday, June 21st, 1913, some members of the Geologists' Association made an excursion to Bishop's Stortford. A full and detailed Report of that excursion by the author and his son, Mr. (now Lieutenant) P. A. Irving, B.A. (of St. John's College, Cambridge), is to be found in the *Proc. Geol. Assoc.*, vol. xxv, 1914. The discovery of the prehistoric hole at Thorley arose out of his observations on the face of the old gravel-pit. Particular attention may be drawn to the geological sections with which that Report is illustrated (Figs. 7 and 8), with the discussion of details in the context. The References appended to it give a bibliography of the recent work which the author has published in the last few years, together with some recent work by Professor J. Cossar Ewart, F.R.S., Edin., to whom, together with Drs. Smith Woodward, F.R.S., and C. W. Andrews, F.R.S., of the British Museum (Natural History), the present writer is indebted for much kind help. The Report of a previous excursion to Bishop's Stortford in 1911 (*Proc. Geol. Assoc.*, vol. xxii, pp. 268 ff.) may be referred to with advantage.]

II.—THE THORLEY PREHISTORIC SITE.

Here the enormous accumulations of gravel, partly probably of pre-quaternary age, are succeeded upwards by a true glacial series of deposits, in which the work of floating ice is well attested. More recent work has enabled the author to present the evidence furnished at Thorley in greater detail (see *Proc. Geol. Assoc.*, "Report of Excursion to Bishop's Stortford," vol. xxv, part 2, 1914), with the excellent photograph taken by Mr. Featherby, and the detailed section across the Stort Valley, both reproduced with the kind permission of the Council of the Geologists' Association.

In the U-shaped trench cut across in the pit face have been found:—

- (a) *Pottery*.—Numerous fragments of very coarse pottery of two or three types: one series, very plentiful, appearing to represent the large, coarse, cinerary urn with minute fragments of bleached flint freely distributed

through the original paste. Many of these are strongly fire-marked. One nearly complete small vase ($3\frac{1}{2}$ inches high) has been recovered in several fragments, possibly a drinking-cup (Saxon type).

- (b) A number of worked flints of the later Stone-Age type (La Madeleine ?), some of which may be pronounced to be contemporary artefacts, according to Mr. R. A. Smith's judgment, along with possible "borers," "gravers," and "scrapers," etc., from older gravels.
- (c) *Charcoal* in fragments is distributed freely through the black silty and clayey matter which fills the lower portion of the pit.
- (d) *Gritstones* and *whinstones* (probably picked out of the boulder-clay itself), blackened and otherwise discoloured by the action of fire, suggestive of their use in the construction of a primitive oven or fire-grate.
- (e) Teeth and bones in fragments in a very rotten state are found in considerable number, including among those identified :—

Equus, upper molar.

Bos, one lower molar complete, also fragments of upper and lower molars.

Sus, m. 3.

No recognizable human remains were found.

But the most interesting "find" under this head is a very rotten fragment of the lower jaw of a horse, with p.m. 1, p.m. 2, p.m. 3, p.m. 4, and m. 1, in place, p.m. 1 being exposed by the rotting away of the mandibular bone. The teeth are longer than the corresponding teeth of the Maple Avenue skeleton, but narrower.

The evidence obtained in this stage of the investigation does not appear sufficient to lead to any definite conclusion as to cremation of the dead or the domestic incidents of the daily life of a primitive settlement.

[To Mr. R. A. Smith, F.S.A., of the British Museum (Bloomsbury), I am much indebted for his patience and courtesy in helping me to compare the pottery remains found at Thorley with those preserved in the National Collection. Mr. Smith recognized specimens from the La Tène (Early Iron) Age, but he was doubtful as to the Bronze Age of the more gritty specimens, on the ground of the high degree of furnace-temperature to which they had been exposed in the baking, suggesting rather the Roman Age. This, however, is to reason from negative evidence, while a comparison of them (through the courtesy of Baron von Hügel) with specimens of undoubted Bronze Age in the Cambridge Ethnological Museum strengthens the inference as to their Bronze Age, which one would naturally draw from the comparison of them with some of those exhibited at Bloomsbury. We have undoubtedly a puzzling problem presented to us here, because of the conflicting nature of the geological and prehistoric evidence. The occurrence of pottery of the Saxon type in such a position as has been described seems to raise rather a wide ethnographic issue, which it might fairly fall within the province of the Anthropological Institute to discuss (December, 1914)].

III.—COMPARISON OF THE THORLEY AND IPSWICH SECTIONS.

After a careful examination of the strata in which the bones of the "Ipswich Man" were found, through the courtesy of Col. Underwood, that gentleman accompanying him to the spot and pointing out the exact position in which the bones were found—and after taking *vertical* measurements on the portion of the pit-face which had been planed down well into the inter-glacial sands for the purpose by one of the workmen—the author of this paper has found the diagram-section published in the *Illustrated London News* (March 23rd, 1912) to be rather misleading, as may be seen from the following observations:—

- (1) The vertical thickness seen *in natura* of the bed *above* where the bones lay is 3 feet, or a little more, *not* 5 feet, as there represented; and there is no differentiation of clay and surface-soil, as there shown. The photograph confirms these corrections, if we take the stature of one of the gentlemen (not a tall man) standing close to the section (on the left hand) as a measure, the print having been verified (through the courtesy of the Curator, Mr. Woolnough) by an inspection of the original photograph in the Ipswich Museum.
- (2) I observed no sign of *calcareous cementation* of the sands¹ under the 3-foot bed of clay, earthy matter, and small stones, as there should be if the 3 feet of material had been decalcified on the spot from such material as is seen in the old brick-pit higher up the plateau.
- (3) The *condition of the materials* of the 3-foot bed is not the same as that presented by the upper weathered part of the chalky boulder clay in the old clay-pit, especially in the absence of *carbonized organic matter* in the latter case.
- (4) Once more, from the 3-foot bed of rubble stuff, half humus, the writer took with his own hand from the face of the pit, about a yard to the right of the excavation and 1 foot above the sands, a weathered flint which bears a most instructive "script." On the one side, where it has lain for a length of time in contact with marshy humus soil, the cortex of the original nodule is deeply iron-stained and coated with *siderite*. On the other side (the side of the fracture) it is strongly *patinated*, the fact telling the tale of long exposure at the surface of the ground. The patination is definitely porcellaneous, and penetrates in places to a depth of 3 mm., according to the molecular structure of the silica of the flint.²

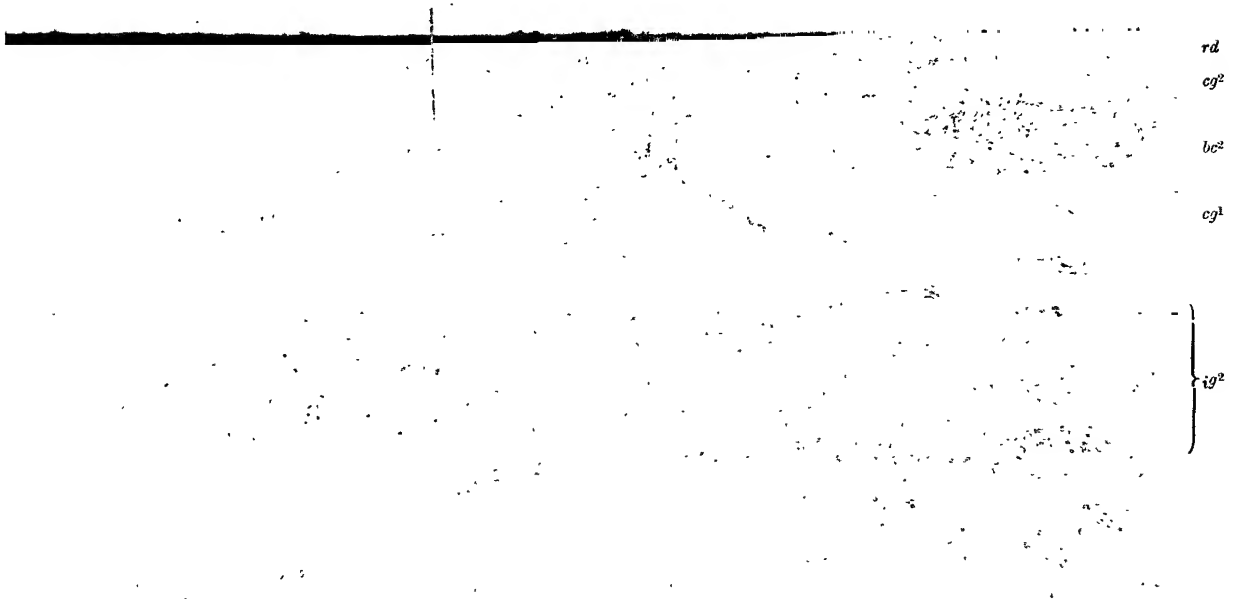
From such evidence as is here cited it is surely warrantable to say that the

¹ The workman's shovel cut through them as if they were so much brown sugar.

² Cf. A. Irving, "Chemical and Physical Studies in the Metamorphism of Rocks" (Longmans, 1889); also paper (by the same) on "Organic Matter as a Geological Agent" (*Proc. Geol. Assoc.*, vol. xii, February, 1892).

conclusions which have been drawn in some quarters as to the vast antiquity (the pre-chalky-boulder-clay age) of the "Ipswich Man" must be largely discounted.

The writer has been surprised to find that the observers in the Ipswich district seem to have ignored Prestwich's papers on the "Rubble-Drift," etc. (*Q.J.G.S.*, 1890 and 1892), as a *phase of denudation* common in these minor upland valleys, although the matter was pressed upon the attention of geologists two years before at Sheffield.¹ Nor do they appear to have referred to the chemical and microscopic work on flints published by the writer so long ago as 1889, including his observations on the *etching action* of organic acids on some of the varieties of silica found in flint, and other rock-forming minerals.² And now the Thorley section has come to light, with a similar 3-foot bed of "rubble-drift" (see Fig. 1,



[Photo by H. G. Featherby.]

FIG. 1.—SECTION IN TWYFORD GRAVEL-PIT, THORLEY, HERTS (NORTH AND SOUTH).

photograph) overlying boulder-clay and prehistoric remains, the most ancient of which certainly are *not older than late palæolithic or neolithic times*,³ even though

¹ Cf. letter in the *Morning Post* of October 13th, 1912, from the present writer.

² Cf. A. Irving, *op. cit.*, Section iii, and App. i. The subject was dealt with in a paper on "Flint and its Genesis" in a paper read before Section C of the B.A. at Birmingham in 1913, See Report for that year.

³ The very arrangement of the bones as shown in *Illustrated London News* (*loc. cit.*) is suggestive of a neolithic or early Bronze Age burial. (See Windle, "Remains of the Prehistoric Age in England," pp. 143 and Fig. 60.)

the bones are at least in as advanced a stage of decay as those of the Ipswich "find"; while there occurs an equally powerful deposit of rubbly drift material overlying them in common with the boulder-clay.¹

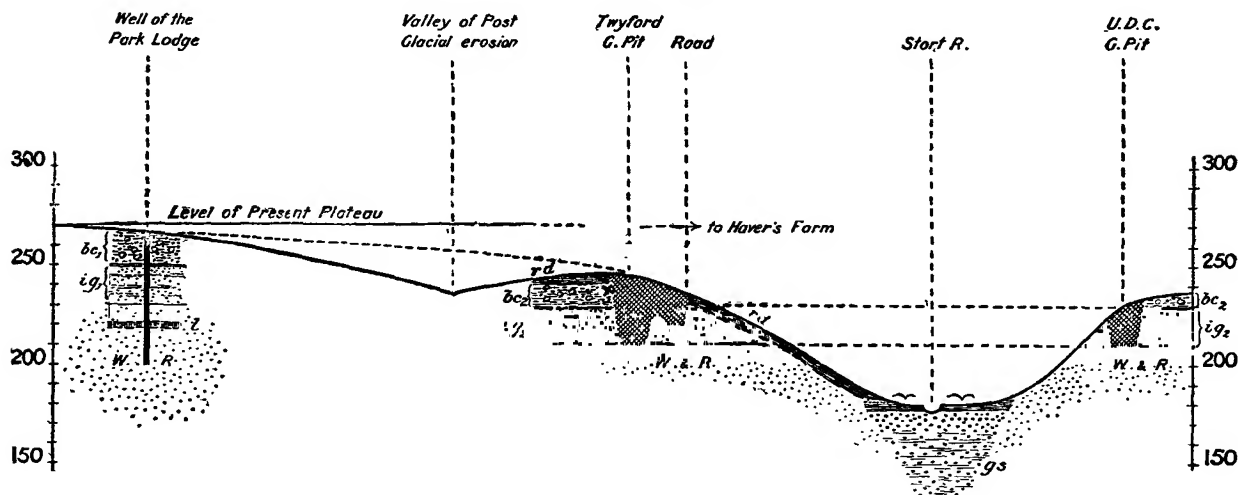


FIG. 2.—SECTION ACROSS THE STORT VALLEY AT THORLEY, HERTS.—*P. A. Irving.*

- | | |
|---|--|
| } Peaty alluvium. | gs Glacial shingle with Pleistocene mammalian remains. |
| rd Rubble drift. | W. R. Woolwich and Reading Beds. |
| bc ¹ and bc ² Boulder-clays. | l Freshwater limestone (<i>B. A. Report</i> , 1911). |
| ig ¹ and ig ² Interglacial gravels. | |

Scale : Vertical 100 feet = 1 inch ; horizontal 880 feet = 1 inch.

x Exact position of the site of the hole which yielded prehistoric remains.

IV.—HOCKERILL SECTIONS.

The Thorley section does not stand alone in the region of the Stort Valley, as furnishing comparative data to aid in determining the stratigraphical position of the human remains found at Messrs. Bolton and Laughlin's pits to the north of Ipswich. The evidence furnished by these sections on the eastern flank of the Stort Valley, and the inferences drawn from it, are given in sufficient fulness (*Report of the Excursion of the Geologists' Association to Bishop's Stortford in 1913*) to make it unnecessary to add anything here to what is published there. Particular attention, however, may be drawn to the sectional diagram (Fig. 3), which is typical of the general succession of the strata along that side of the Stort Valley, as they have been recently laid open in sections at Hockerill churchyard, and at the lower part of the Dunmow Road continuous with Hockerill Street.

¹ This Thorley boulder-clay, according to present views, is a separate and later deposit than the chalky boulder-clay ("Riss"), and probably represents the "Würm" period of Penck and Brückner (see *B.A. Reports*, Birmingham meeting, 1913, p. 480; also *Proc. Geol. Assoc.*, *loc. cit.*).

The occasion seems to arise (in connection with what has been written) for emphasising the importance of distinguishing between the use of the phrase "boulder-clay" as a *connotative* or a *denotative* term. To assert that certain remains were found in or under "boulder-clay" because they were found in or under a deposit containing *débris*, such as might also be found in the "boulder-clay," is

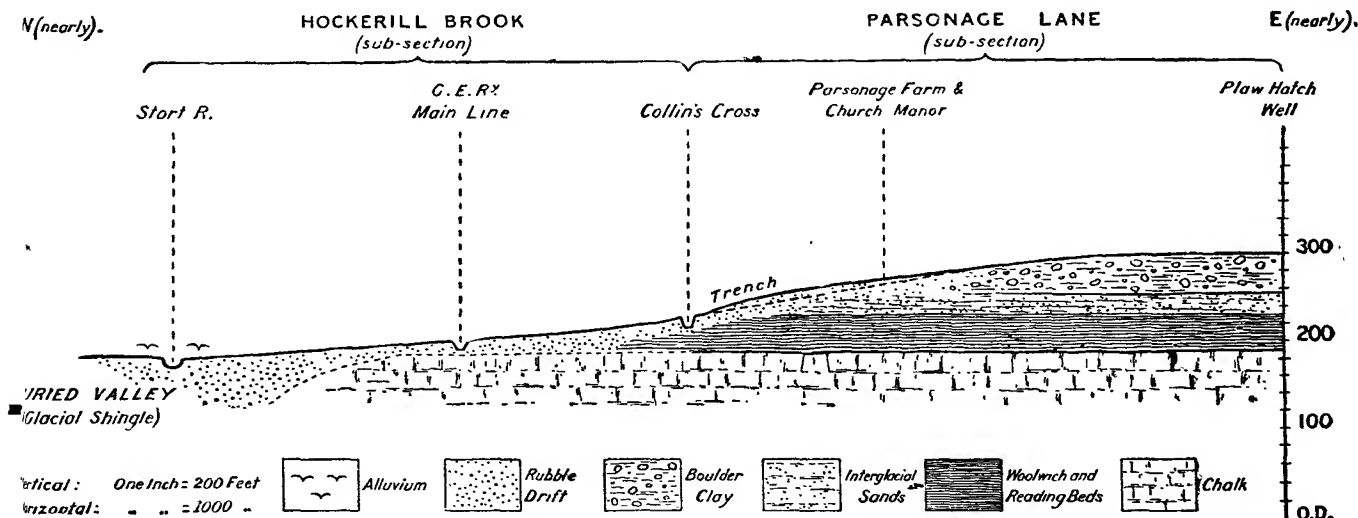


FIG. 3. SECTION TO ILLUSTRATE THE RELATION OF THE CHALKY BOULDER-CLAY TO THE "RUBBLE DRIFT" ON THE EASTERN FLANK OF THE STORT VALLEY (BISHOP'S STORTFORD).—P. A. Irving.

NOTE.—(1) The structure of the Parsonage Lane portion of the "Rubble Drift," as seen in the open trench, compares very well with that shown in Prestwich's diagram, Fig. 3 of his paper (iii), in *Quart. Journ. Geol. Soc.*, vol. xlviii, p. 268; so far the 3-foot trench revealed its structure. (2) This section is taken at $1\frac{1}{4}$ miles higher up the Stort Valley than the Thorley section (Fig. 2).

simply misleading. In geological science the latter term has been used to denote a recognizable formation laid down directly by the "inland ice" on melting away, and containing, therefore, erratics brought from distant localities, as has been of late so splendidly illustrated in the case of the continuous section a mile long to the south of Harlow¹ (Essex).

Every student of exact science has a right to protest against such ambiguity ("terminological inexactitude") as is here indicated. It vitiates, for example, the reasoning of Mr. Reid Moir's public statements as reported in the *East Anglian Times* for February 21st, 1913. See also Mr. Moir's letter to *Nature* (September 12th, 1912). Having had the recent experience of the Harlow boulder-clay, and having for the last twenty years given attention to many sections in the Stort country, including careful observation of numerous grave-sections with their output, where the chalky boulder-clay is undoubtedly *in situ*, overlying interglacial gravel, with negative results, Mr. Moir's statements do not carry conviction to my mind, as was intimated in my letter to the *Morning Post* (*supra cit.*).

¹ See *Nature* for June 20th and August 22nd, 1912; also Report of the B.A. Committee on Erratic Blocks (Dundee meeting, 1912).

Again, if we revert to the horse bones (humanly wrought) found under 12 feet of rubble-drift,¹ we have evidence immensely stronger than the Ipswich section presents, which, on the principles of interpretation of the facts adopted in that case would lead us to the conclusion that in the Stort Valley we had evidence of "pre-boulder-clay man" along with a "pre-boulder-clay" wild horse!

V.—THE MAPLE AVENUE SECTION.

The opposite side of the Stort Valley furnishes an interesting instance of the "rubble-drift" and its relation to the solid geology of the terrain. The horse-skeleton figured in the *Illustrated London News* for June 5th, 1909, was found under 4 to 5 feet of such material, in this case so largely composed of *remanie* clay from the London Clay of the hill, with numerous erratics from the glacial drift of the hill-cap embedded in it, that, without a thorough examination of the structure of the hill, by borings and excavations, confirmed by more recent excavations for building purposes, and sections furnished by two wells at the pumping-station of the town water-works (350 yards distant), it would have been easy to jump to the conclusion that we had there a "pre-boulder-clay" horse! For, in the excavation of the pond-basin it was clear to me—as it was to an experienced builder, Mr. J. Day, to Mr. Featherby, the engineer, and to the workman, Curtis (who had spent all his life in the brickyards of the district)—that the deposit in which the skeleton was found had never been disturbed by the hand of man, though there were signs of shearing movement, as the landslides had crept down the hill-slope. It is not necessary to go further into details here, since the exploration of the site has been fully reported and published in the Report of the B.A. for 1911 (Portsmouth Meeting (pp. 131 ff.)).

VI.—THE HATFIELD OX.

To the above evidence furnished in the region of the Stort Valley it may be of interest to add a note on the "Hatfield Ox" described in *Nature* (May 2nd 1912). The decayed and rotten skull of the animal lay under 2 to 3 feet of earthy rubble-drift composed of material (*remanie*) from the chalky boulder-clay of the plateau. [Mr. Featherby, with his experienced power of observation, saw this in making the excavation for a well to supply water to the adjoining farm, and promptly drew my attention to it.] The bones of the trunk lay partly embedded in the inter-glacial sands, and together with the mandibles and teeth were in a remarkable state of preservation as compared with the condition of the bones of the skull. Here we had probably a stray ox of the time of the Essex Forest Laws, so embedded that superficial observation might have jumped to the conclusion similar to that arrived at in the case of the "Ipswich Man." The plateau is

¹ In the Parsonage Lane section (*supra*).

composed of the chalky boulder-clay. The Ipswich observer would have, I think, but little difficulty in recognizing the striking similarity between the lie of the ground at Hatfield Broad Oak and that of the district above the Gipping Valley, where Messrs. Bolton and Laughlin's pits are situated. At the end of the letter to *Nature* here referred to the present author pointed out (as he did on the reading of the paper) the bearing of these facts upon the true interpretation of the conditions under which the bones of the "Ipswich man" were found; but his remarks were not printed.

A very similar deposit, moreover, to that at Charsfield (described and figured in *Nature*, May 16th, 1912)¹ of undoubted "rubble-drift" was exposed in the sewer-trench at Thorley in the summer of 1911. The very photograph in *Nature* (*loc. cit.*), with its truthfulness to nature, shows signs in one place of the shearing movements of the more clayey part of the material.²

It may be said, in fact, that, so far, no valid evidence of the pre-chalky boulder-clay age of the "Ipswich man" has yet been adduced from the Suffolk country, and that therefore the position taken by the present writer in the *Morning Post* of October 15th, 1913, was fully justified, while the large deductions drawn by Professor Arthur Keith from that assumption are seen to be baseless.

Note.—The hominid *Eoanthropus dawsoni* (Piltdown) is undoubtedly of pre-chalky boulder-clay age. I have suggested (*Morning Post*, January 2nd, 1913) the "Mindel-Riss" inter-glacial period for it, the period to which Werth has assigned *Homo heidelbergensis*. See *Globus*, Band xlvi, No. 15 (pp. 30 ff.). All this goes to support Dr. Smith Woodward's assignment of *Eoanthropus* to the "older pleistocene."

¹ Referred to in *Proc. Geol. Assoc.*, vol. xxv (p. 106).

² Mr. Woolnough informs me that the photograph was inverted in its position on the page of *Nature*.

NOTES ON THE HYPOGEUM AT HAL-SAFLENI, MALTA.

By the Rev. H. J. DUKINFELD ASTLEY, M.A., Litt.D., F.R.Hist.S.

[Abstract of Paper read before the British Association, Section H, Sheffield, 1910.]

AMONG the prehistoric monuments which make the Islands of Malta and Gozo so interesting to the student, none is more suggestive than the so-called hypogeum, or subterranean necropolis, discovered at Hal-Safieni in 1902. It is situated near the village of Paula, at the head of the grand harbour of Valetta, and has been admirably described by Dr. Zammit, Curator of the Valetta Museum, in a *Report on the excavations at Hal-Safieni*, published in 1910.

In the month of February in that year I had the good fortune to visit the hypogeum, which consists of four sets of caves and galleries cut in the calcareous rock, and extends over rather more than 500 square yards, and I examined thoroughly the remains of interments, skeletons, pottery, and figurines discovered therein.

From this examination I agree with Dr. Ashby and Mr. Peet (*Brit. Assoc. Rep.*, 1909), that it may be assigned to the late Neolithic Age of Mediterranean culture.

As to the general aspects of this ancient necropolis I say no more; there is one point which specially struck me as bearing on the subject with which I dealt in a paper published in this *Journal* in 1911, viz., the decorations on the walls and roof of three of the chambers, and on the lintels and door of a fourth.

These are executed in red paint, and are quite distinct, though somewhat worn by time and the infiltration of water, and consist of cup- and ring-markings and spiral ornamentation. These are well described by Dr. Zammit in the report referred to above, although he speaks of "discs" and spirals. These so-called "discs" are unmistakable cup- and ring-markings, but as they are painted, as in most of the examples furnished by the natives of Australia at the present day, and not incised, the central cup-like depression is indicated by a spot of the red paint. This scheme of ornamentation is that which, to my mind, constitutes the principal interest of the hypogeum, for it gives us the sure criterion by which we may judge of its date and provenance.

Not so long ago it was the fashion to describe the monuments at Hagiar Kim, Mnajdra and Ggantija as Phœnician temples, and even the learned work of Perrot and Chipiez is vitiated by this bias. On this point, see *Man*, 1901, 146; 1902, 32; and compare Evans' *Mycenæan Tree and Pillar-cult*, 98-102.

At Hal-Saflieni, as at Hagiar Kim, we do indeed find the "standing pillar," which testifies that it was not only a place of interment, but also "the seat of an aniconic pillar-cult parallel to that of the Egean world," but this is only an additional argument against the Phœnician theory.

Readers of my paper on "cup- and ring-markings," referred to above (*J.R.A.I.*, vol. xli, 83-100), will not need to be reminded of the proofs therein adduced that such ornamentation belongs to the Neolithic Age of European culture, and is the sign-manual of the Neolithic stage of culture wherever it occurs, as in Australia to-day; so that the fact that the chambers at Hal-Saflieni are so adorned, falls into line with the conclusions derived from the interments, the pottery, and the figurines, that this hypogeum is the work of the aboriginal Libyan inhabitants of the islands in the Neolithic Age.

But that it belongs, at least in its completed form, to the later part of this long period of time, or even to the early Bronze Age, is proved by the presence of the spiral ornamentation which is found also at Hagiar Kim, Giganteja, etc., and is a sure testimony to the influence of Egean culture, and probably, the immigration of Egean settlers, to whom the introduction of the aniconic Pillar-cult would also be due. On this point the reader may consult Evans' *Mycenæan Tree and Pillar-cult*, 98-102, and Prof. Hoernes, *Urgeschichte der bildenden Kunst in Europa*, 128, 129, 191, 192.

Accordingly, the date to which this hypogeum, with the other prehistoric monuments in Malta and the neighbouring islands, may be approximately assigned is from 2500 to 2000 B.C., more than 1,000 years before the Phœnicians set foot upon their shores.

It is an interesting problem whether the cup- and ring-markings, and, we may add, the spirals in this necropolis represent a totemistic stage of culture on the part of those who excavated it.

In the paper referred to above I argued, from the customs of primitive peoples at the present day, more particularly the natives of Australia, that wherever it occurs this scheme of ornamentation belongs to a state of society organized on a basis of totemism, and that these devices represent the totemic clan, and are, in fact, the heraldry of primitive man.

Dr. J. G. Frazer (now Sir James G. Frazer), indeed, doubts whether totemism ever existed among the ancestors of the civilized races (*Totemism and Exogamy*, 1910, Preface, xiii, xiv), but I think he is too cautious, and overlooks much available evidence; such, for example, as the animal, insect, and plant cults of Ancient Egypt, the unmistakable traces of totemism in the Old Testament, with which I have dealt elsewhere, and the relics in the customs, superstitions and folklore of Europe. To return to the subject of ornament, we have to remember that, in the case of primitive man, it is never capricious; it ever has a definite meaning. That meaning may be religious, magical, or, as I believe, totemic, *i.e.*, heraldic, to use a modern term. Heraldry itself, with its grotesque animal forms and other quaint devices, is probably an off-shoot from totemism.

These devices tell the tribe, clan, family, of the living or deceased warrior to those who know.

This is the case, it seems likely, in this necropolis. The cup- and ring-markings and spirals are found in the four innermost chambers, the sacred and secret arcana of the tribe, and they told to their descendants, as long as they could understand the signs, the clan or family, and the rank, of those who were buried there, in the same way that the spirals on the great stones at the entrance of Newgrange, in Ireland, may be supposed to have conveyed the same information to the descendants of those who were interred in its central chamber.

This, it seems to me, throws much unexpected and welcome light upon the ideas and social customs of our prehistoric forerunners in Europe of the Neolithic and Bronze Ages.

HASAN AND THE PRINCESS.

By G. W. MURRAY.

FOR the sake of uniformity, the notation employed in the Nubian story which follows is that employed by Professor Schaefer, of Berlin, in the translation of the Gospels recently published by the British and Foreign Bible Society. The letter ñ, which does not occur in his translation, though he recognizes its existence in the preface, corresponds to *ny* in *canyon*. The + prefixed to certain words denotes that they are Arabic loanwords (often with Nubian prefixes and suffixes), and must be looked for in an Arabic and not a Nubian dictionary. The story was told by Muhammad Bedda Sala of Shellal.

NUBIAN.

1. KUMA NOSSO WEKKI EKKI BIWĒTIRI, KUMA +JAKMAL. “+HĒRISHALLA!” ID WĒRI ĒN WĒR DĀKĒRAN, WĒRĒKI EDOSIRGI AGRANGŌN OGĪJ WĒRI BURU WEKKI USKISAN. TIMBAB KA WĒRI DULANOSSUM. +ĀDEMĪ BERBŪLIRTŌN TIMBAB KA WĒRI TŌDKI WĒTIRSUM. “ANN WĒRĒGI BIGIJIRKI, EKKI +ĀDEM WĒRI TĀRGI, +GAHWA +FINJANGI NĀAKIN MŌNOS! AIGŌN YA INONGU YA ASALGI BIDIOSRI. AIGŌN ILĀHINDI KIRIGI EKKI +HEDYĒRI.” IKKE WERESSUNGŌN TIMBAB DIOSSUM. TŌDKŌN TIMBAB DIOSINN +AHARRO DUGU KOCHI WEKKI INJED BELOSSUM. JŪRGŌN +ARABĪA WEKKI EGIREDIRGI TAIMBŪNGŌN, TENNA +SĀHIBI TEKKE UWESSAN. “HASAN!” TEKKŌN. “HOI!” ESUM. “INDO TĀ! TĀRGI +GAHWAGI NĪ!” TEKKŌN “ĀMŌNOSI.” TIMBAB TEKKE WĒTIRSINGI JĪLOSIRGI. JŪRGŌN IN TENN +SĀHIBI SHIDAGED ARESSAN, +GAHWAN TŪR JŪSAN, +GAHWAJIGI UWESSAN, HASAN MINGI BINĪNGI NALESSAN. HASANGŌN. “+GAHWA WEKKI ATTĀR!” ESUM. TINNAN +GAHWAGI NĪEDIRGŌN, HASAN. “BITAINOSRI.” ESUM “KĀCHIGI ABIR.” “ASALGI TĀR!” ESAN. “ASALGI +JAMAN BIGRĪDIRU, SITTĀKI BITĀR?” TEKKŌN HASANGŌN WĒTIJIRSUM. “+DUHURN +AHARRO, +SĀ ŌWIN +AHARRO BITĀRI.” TINĒNNAI KĀCHIR JŪSUM. TIMBABNAN DUGU BŪLLOTŌN KOCHI WEKKI INJESSUM, +SĀ ŌWIGED +DUHURN +AHARRO TENN +SĀHIBINAI TĀSUM. TĀRGŌN +JINĒNA WĒR TŪR TĒGOSAN. MANGU GA WĒRI EGED WEKKI DESSIR KARIJKIDIRGI TINNAN KUSUGI OJJŪSAN. MERISAGŌN NĪEDIRGI KUSUGŌN KALEDIRGI TAISINN +WATTIGI HASAN WĒTIJIRSUM. “INNAI +HĀJACHI MUKOTI DURBŪRAN?” TENN +SĀHIBI WĒTIRSAN. “HASAN, ER MINNAI ARGĪ KOYIN UGROSIRTŌN BI+ZĀLEKIRIRIN?”

HASANGŌN WĒTJIRSUM. "ILLA, +WALLĀHI AIGI WEDEDONGI!" TEPOS, TENN +SĀHIBIGŌN WĒTIRSAN. "+GIRSH IMIL ŌWI DURBŪM!" HASAN TEKKŌN IN +GIRSH IMIL ŌWIGI TIJIROSSUM. TENN DOGOR USWESSAN, NOGKŌRAN. KĀCHIR JŪRGŌN, TIMBABNAN DUGUGI +GELBAJŪRGI KASHU ELKŌMNUM. TINĒNGŌN TINESIGŌN DUGU MALĒGI KAWIRGI AREDKI GŌLAGI KUŅOSSAN. TENN DOGOR TĒGOSSAN. TINĒNGŌN TINESIGŌN HASAN GA WĒRI +ZĀLOSSUM. +ZĀLOSAGINGŌN TINĒNGI WĒTIRSUM. "AI +SHEYAL BI+HIDMĒRI, KADENAN DILIG WĒRI +TELĪSNA AGABĒKŌN DĒNU!" WĒRINGAD, TŌDKŌN +TELĪSKI TENNAN JERRO KUJRESSUM TAINOSSUM. TAIMBŪNGŌN TENN+ SĀHIBI UWESSAN. "ER TŌD +SHEYAL, ER +FĀDIRĒ?" TEKKŌN. "EYO!" ESUM. "INDO TĀ!" TEKKŌN TAICHISUM. EGED WEKKI +KETFIR KUJROSIRSAN, INJEDIRGI HASANGI WĒTIRSAN. "+JINĒNAR OIJŪ!" WESAN. EGEDKI +KETFIR KUJIRKAGINGŌN +ABU KODRO WĒR JOGIN +AHARDIGI MERENOGSUM. HASANGŌN ZĀLOSSUM, +JINENAR OIJOSSUM. TENNA +SĀHIBI JŪSAN, +ZĀLOSSAN. "DOBBO UBURTI! EGEDNAN BAGATTI SĒ? ER +HARĀMI MA." +KEFFI-CHIGED JAKISAN. HASANGŌN JORENGŌN TĒGOSSUM. TENNA +SĀHIBI WĒR WĒTJIRSUM. "+YA +MARRASĪN, TENNAN HASANNAN DUGU MALĒGI IR Ā+JELAIERU. WĒR NUTIN +GIRSH IMIL WEKKI TIRWĒ! IR BITIRMEKORUNGŌN KANDIGED INNAN URKI BIMERTIJIRRI!" JŪRGŌN TIR MALĒ +GIRSH IMIL WEKKI NEWERTI DIMIN TIROSSAN. HASAN GA WĒRI KĀCHIR TINĒNNAI JŪSUM. DUGUN BAGATTI TINĒNGI BAGOSIRSUM. TINĒNGI WĒTIRSUM. "AI IN +BELEDIR BITĒGMENIM. AI INONGU ARSINNAN JAKITKŌN +GULUBKŌN +KEFFĒN. AI BINOGRI. AI ADI NOGSI!"

2. +MEDĪNA WĒRR JŪSUM. UGROS WĒRI TĒGOSIRGI +BELED +BARRIR JŪSUM. +GIRBA WEKKI ESIGED EŅEKIREDIRGI +NAHASNAN ISBITTI ŌWIGŌN AWESSUM ABURTOGO UNDURESSUM. "AMBABKI +HASANAGI BAUTIRI!" JŪRGŌN INJEDIRGI +GIRBAGI. TAIMBŪNGŌN ORNAN BURU WĒR. "ESIGI KINEKKI DĒNOS!" ESUM. TEKKŌN TIRSUM. BURUGŌN NĒIDIRGI ESIRTŌN GUROSSUM NOGKON. +ASKAR WEKKŌN HASANĠ. "ESITŌDEKKI DĒNOS!" ESUM. HASANGŌN "+HADIR, +YA +SĪDĪ" ESUM. NĒIDIRGI +ASKAR GUROSSUM, ORKI BŌDIRGI WĒTIRSUM. "MEDĪN-ANDI WĒR ESIGI ILĀHINDI KIRIGI +ĀDEMĪGI AGIDIRIN. TENNA ESIGŌN ILĀHINAN +KARAMIRTŌN INGIRRI MA." ORKŌN WĒTIRSUM +ASKARKI. "JŪRGI +SAGGAGI ATTĀR!" ESUM. TEKKŌN +DEHEBNAN ISBITTI WERĪGI AWEDIRGI, ORNAI KIRIGI NOGSUM. ORNAI TĀRENGAD, "ESITŌDEKKI ATTĀR, WO +SAGGA!" ESUM. +SAGGAGŌN BOGTIRSUM ISBITTI +DEHEBDI WERRO. NĒIDIRGI, "WEKKŌN ATTĀR!" ESUM. TEKKŌN TIRSUM. ORKŌN WĒTIRSUM. "ENN ESHĒ SAI TERRĒ?" HASANGŌN WĒTIRSUM. "AI MEDĪNIRTŌN ERI ANDIGI." TEKKŌN OR ISIGSUM. "ER MINNAI INDO TĀR?" HASANGŌN TEKKODŌN +GERITAKKEL MALĒGI WĒTIRSUM. "AMBABKŌN DIOSSUM." ESUM. OR TEKKI WĒTIRSUM. "IMBABNAN +HASNA +SANDŪK WEKKI AIGI +SELIFIDAGSUM. +MEDAMMA IMBAB DIOSINDI ER AREDU!" TEKKŌN HASANGŌN WĒTIRSUM. "ILLA, ELLEKEN BARMENIM. JEM KEMSIN +AHARRO AMBABKI +SADAGAGI AGAUTIRGI TĀRGI BARKANDI." NOGSUM. HASAN JŪRGI +SADAGAGI AGAWIRGI JEM KEMSIN +AHARRO JŪSUM ORNAI. ORKŌN WĒTIRSUM. "IMBABNAN DUGUGI AREDU, WO HASAN!" +SERAI WEKKŌN OR +BASTOSIRGI GUROSIRGI HASANGI TIROSSUM.

3. HASANGŌN MAN BURU DOLOSSUM, DIGRĠGIRIGI ĀDOLSUM. DOROTŌDEKKI ISIGSUM. "AIGI ORNAN BURUGI BESKEDKIN?" "BESKETTĀRI, +LAKIN AI ATTĀRGI NOGO KIRIGI +SABAGOSIRIGI +DELLALIR SHUGUDIRI. SHUGUDOSEKIRIN OR TĀRGI +DĠNAR IMIL WEKKI AUKIN, EKKŌN IMIL TOSKI AU!" IKKE WĒROS NOGSUM DOROTŌD BURUGI ATTĀRI AN. BARAT WEKKI +BABŪR BARRINDI KIROSSUM. EGIREDIRGI +SIKKAN DOGOR KUJIROS NOGSUM BURUGI ATTĀRI AN. JŪRGŌN ORNAN ESHĒR MEDĠNAN GUBALLO KUTESSUM. TENNAN BARATKI +SIKKARTŌN INJIRGI +ARDIR USKIROS +ARABĠA +HANTŪR KIROSSUM, ORNAN KĀCHIGI ISIGINGŌN, JŪESSUM, +BŌABKI ELSUM. +BŌABKI ISIGSUM. "ORNAN ĒNGI NALARKI +UZĒRI." +BOABKŌN. "+SABURĒ, +SITTĠGI ISIGI TĀRI MOKON." DOROTŌDKŌN WĒTIRSUM +BŌABKI. "WĒTIR!" ESUM, "ORN ĒNGI 'IMBANNAN BURU WĒR INDOR MAN ANDIGI.'" +BŌABKŌN KUJIRGI ORNAN ĒNGI WĒTIRSUM. "IMBANNAN BURU WĒR ENNAI TĀRIRKI +UZĒ ANDIGI." ORNAN ĒN "TARAN!" ESUM. DOROTŌDKŌN TŌJŪSUM. ĒNGI +SALAMOS TENNAN BURUGŌN +SALAMOSIRGŌN BURUN TINĒNGI ISIGSUM. "ENNAN BURU +FETARĒ +WALA EDBŪM?" TINĒNGŌN WĒTIRSUM. "+FETAM ANDIGI." DOROTŌDKŌN WĒTIRSUM. "ILLA, ENN BURU EDBŪNAN." BURUN TINĒNGŌN WĒTIRSUM. "ILLA, EDBŪMNUM." ESUM. DOROTŌDKŌN WĒTIRSUM. "TENN TŪGI WARKIDIRGI NAL." ESUM. TINĒNGŌN KADEGI SUKKIRGI BURUN TŪGI NALSUM. AFFI WĒR DABŪM. DOROTŌD BURUGI +SAHIROSSUM. +SAHIRENGAD MEWANOSSUM. TINĒN BURUNAN TIMBANNA SARKIGED JORENGŌN TĒGOSSUM. DOROTŌD WĒTIRSUM. "SARKIMENU!" TEKKŌN TINĒN WĒTIRSUM. "+YALLA, DOROTŌD, EKKODŌN AREDJŪRGI, TIMBAB TĀRGI NALMENINGŌN, +BELED WERIR OJJŪRGI, USKOSKIN ATTADĒCCHI." DOROTŌD "SERĒ AN DOGORM." ESUM. +JINĒ IMIL KEMISKI TIROSSUM ORNAN ĒN. BURUGŌN TENNA +SĠGAGŌN +DĠNARIGI +HĀJA MALĒGI INJESSUM. TEKKŌN DOROTŌDKŌN NOGSAN. TINNAN +ARABĠA +HANTŪRRO EGIROSSAN. TAINDANGŌN +SIKKANA +JEMBI KUTOS BARATKI +SIKKAN DOGOR KUJIROS, BARATNA DOGOR EGIROS, +SAFAROSSAN. +SIKKAN DOGŌGI HASANNAN ESHĒR JŪRGI, KUTESSAN. DOROTŌDKŌN BURUGŌN WERĒKI AREDIRGI, DOROTŌD BURUGI TENNA KĀCHIR OIJŪSUM, NOGO KIRIGI +SABAGOSSUM. +SABAGOSIRIGI +DELLALIR ATTĀRGI SHUGUDOSSUM. OR HASANGI +SERAIAGI TIRELGŌN, OR ŌWITTI WEKKŌN, HASANGŌN +BEZĀRKI BURUR AGAURAN. ORĠ ISIGSAN. "ĒR IN NOGOGI BIJANOSINĀ?" DOROTŌDKŌN "ĒVO" ESUM. ORIRTŌN WEKKŌN +DĠNAR IMIL WEKKI AUSUM. ŌWITTIGŌN +DĠNAR IMIL ŌWIGI AUSUM. ORĠGŌN HASANGI Ā+JAHADĒTIRAN. "ĒR WILGI +GIRBAGI +KETFIR KUJIREDAĠISUM MINNAI ARGĠ TĀRGI +DAĠĠGE ERI?" HASANGŌN DOROTŌDKI WĒTIRSUM. "+DĠNAR IMIL DIJKI BIJANOSINĀ?" ESUM. TEKKŌN "+KESSIB OSIM" ESUM. TENN NOGOGI HASAN AREDIRGŌN KĀCHIR NOGSUM +WALA HASAN OIRBŪMNUM NOGO YEKIN WALA ARO YEKIN. +SERAIR OIJŪSUM. TĒGOSSAN ŌWI ANDIGI. HASAN BURUNAN KOIGI NALSUM. URUMĒ MA. +ZĀLOSSUM HASAN. +ZĀLOSIRGŌN WARĠKIRI TURBOSSUM UGU KOBBLŪGI. GU +BEYINGAD ORKI WĒTIRSUM. "AIGI +ASKAR WĒRI DĒNU!" ESUM. ORKŌN "SERĒM" ESUM. +ASKARKI ARETTĀRGI NOGOGI KIYERGI TIROSSUM. "INGI NOGOGI ANĒN GUNAI MEDĠNAR KĀ +FULANDO OIJOSSU!" HASAN ISHINTI-JIRSUM.

4. +ASKARKÖN +BABURRO AREDIRGI EGIROSSUM, HASANNAN TINĒNNAN ESHĒR JŪSUM, KUTOSSUM +BABURROTÖN, ISIGSUM +ĀDEMĪGI. "HASENNAN TINĒNNAN KĀCHI SAI TĒBIN?" +ĀDEMĪGÖN WĒTIRSAN. "ALAI MA KĀ TERM" ESAN. TEKKÖN +ASKAR BURUGI AREDIRGI JŪRGI, +BABKI JOMSUM. JOMINGAD "ER NI TERRĒ?" ESUM HASANNAN TINĒN. +ĀSKARKÖN "AI TER ERI" ESUM. +BABKI KUSIRSAN. TÖJŪSUM ARĒR KĀ TŪR. HASANNA TINĒNGÖN TINESIGÖN +SALAMOSIR BURUGÖN +SALAMOSIR +ASKAR WĒTIJIRSUM. "BURUGI HASANIRGI ISHINEDAGTIJIRRI." HASANNA TINĒNGÖN WĒSUM. "AR +HAZĪN ERU. HASANN TIMBAB ULAGŪDIR DIOSSUM. MINGIRIGI NOGORIGI +HIDMELLIĞI AIGI ISHINDECCHIRIN?" TINĒN +ZĀLOSSUM. +ASKAR NOGSUM. BURUGÖN UGROS DIMINGI +SELLIMIR DOGOR TĒGSUM UGUGED UGROSKED. HASANNAN TINĒNGÖN TINESIGÖN TINNAI DUGUTÖD BAJOSSUM. TINNA +RAGĪF +HABBITÖDEKKI JANDIGI ATTAKA OSI TOGOR UNDURED TĒGOSKA, TENNA BURUGI BAGATTIGI ATTIRIN, TEKKÖN BAGATTIGI ĀKALIN, +WALA IN NOGO UGROS DIMINGI +SELLIMIR AGILGI GATTINA KINATÖDEKKI ĀTIRMINAN KALGI. BURUGÖN NOGO GA WĒRI ORGITKED DIOSRI AN DĀN, +DĪNAR DIMINGI OSIRGI TENNA +JĒBIRTÖN TIJIRSUM, HASANNA TINĒNGI WĒTIRSUM. "INGI AREDIGI OJJŪRGI JANOSIRGI ATTĀR!" ESUM "KALKIRIGI." HASANNAN TINĒNGÖN DUGUGI NALOSIRGI GUROSIRGI "WAI AMBURTÖD! ER INDO TERRĒ AGSIN?" TEKKÖN "ĒYO" WESUM. JŪRGI +MAHBUB IMIL WEKKI DUGUKIR ATTOSSUM. WIDEGÖN +DĪNAR IMIL WEKKI TIRSUM. HASANNA TINĒNGÖN GUROSSUM DUGU DIGRI NALOSIRGI. IN NOGOGÖN TIRGÖN +ADEL ANOSSAN, WERĒKODÖN +HELU +ADEL ANOSSAN. BURUGÖN NOGO GA WĒRI TIROSSUM +DĪNAR IMIL ÖWIGI. "INNAN +SERAIAGED ALLEWE!" ESUM. ALLOSSAN ORINDI NAURĒ. BURU +ARABĪA WEKKI ARET TĀSUM KĀCHIR IN +BUYAGI ĀJOMILGI. "WO AMBANNA, KĀN DOGOR AMELKIRIGI TONJILKIRIGI +NEGRISHER!" ESUM. TEKKÖN "SERĒM" ESUM. TONJILKIR AMELKIR GOIOSSAN. UGROS TOSKI KEMSIN +AHARRO BURUGÖN HASANNAN TINĒNGÖN TINESIGÖN TĒGOSIRGI WERĒKI ĀWĒTIJIRAN.

5. BURU WĒTIRSUM. "AI +HAMMĀMIR BIJŪRI AN." HASANNAN TINĒNGÖN TINESIGÖN. "UGROS MUKOTIRĒ" ESAN "ARGÖN JŪKOMUNU?" "JAMAN BIJŪRU." "SERĒM" ESAN. +ARABĪA +HANTŪR WEKKI UWIRGI, EGIROSSAN. TENN KADECHĪGÖN ĀNIJILNAI ĀNIJINGÖN +HALSÖSIRGI ATTĀROSIRSAN. +HAMMĀMKIR NOGSAN. +HAMMĀM TŪR JŪRGI TOROSSAN. IN +HAMMĀMNAN ĀBÖWIKIDIL ĒNUM, ASHMANGED BURUGI BÖWIKIDISINN +WATTIGI, BURU NOGO INGÖN ARO ANOSSUM. +HAMMĀMNAN ĒNNAIGÖN TÖD WĒR DĀN, MUHAMMAD +GŪBGÖN GENUM. INGÖN HASANNAN TINĒNGÖN TINESIGÖN BURU NOGO AMBIELGÖN NOGSAN. +HAMMĀMNAN ĒNNAN TÖD MUHAMMAD +GŪBA TINĒNGI TĀRGI WĒTIRSUM. "WALLĀHI! YA IYOYO, MAN BURU URUMĒGON SHUKINGAD ARO ANILGI ATTĀDEMEKIN, AI IN +BELEDIR TĒGMENINGI." ĀJOREGÖN GENIN. TINĒNGÖN TEKKE WĒTIRSUM. "IN EGITTÖDKI AI JŪRGI EKKE BATTĀRI." NOGSUM, TINĒN BURU HASANNAN ISHISINGI JŪRGI ATTĀRI AN. HASANNGÖN KĀCHIR JŪRGI +BABKI JOMSUM. TIRGÖN "ER NI TERRĒ?" ESAN. TEKKÖN "AI TER ERI." ESUM. "TĀR!" ESAN. TÖJŪRGÖN KĀ TŪR ARĒR JŪRGÖN BURUGI WĒTIRSUM. "ER HAMMĀM TŪR DĀBÜNGÖN +ĀDEM MALĒ EKKE Ā+SHAKRERAN. ORINA BUNORĒCHI MALĒGON TEDDORI ERKANĒ WĒR DĀN ANDIGI

EKKI TĀR ESAN." BURUGŌN HASANNAN TINĒNGI TINESIGŌN WĒTIJIRSUM. "TAIWE! +JAMANDIGI JŪRGI TĀRU." TIRGŌN MONOSSAN. "ĀR BESKEJUMNU." TEKKŌN AGUDAN TENNAN +ARABĪA WERRO EGIREDIRGI TĀSUM +HAMMĀMNAI. IN ĒNGŌN +HAMMĀNGI KUSIRGI, TENN TŌDKI UNDUROSSUM, +BABKI SHIRKOSIRGI, TŌDNAN TINĒN KUSEDĪGI INJEDIRGI NOGSUM. BURU ARĒGI ABIR TŌD TĀSUM. "TŌD +GŪB AGIL, ER MINGI BIRGIN?" ESUM. BURU IKKE ĀDIDSUM "ELLEKEN INĒN, DOBBO UBURTI! GARI! ANN DOGOR AGOSSUM." MUHAMMAD +GŪBA WĒTIRSUM. "AI ENNAN JŌRO BIDIOSRI" ESUM. BURUGŌN WĒTIRSUM. "YA ER MINGI BIRGIN?" TEKKŌN "INDOGI ABIR TĀR!" ESUM. TŌDKI BURU IKKE ĀWĒTIRIN. "MINNAI TĀRI?" ESUM. "TĀRGI KINEKKI WERĒKODŌN WENISAKKIRU" WESUM. BURUGŌN +KURSI +HAMMĀMDIGI INJIRGI TŌDNAN URRO WEKKI TIRSUM. TŌDKŌN ĀJOREN. BURUGŌN ĀJAKIN. TINĒNGI AGUWE ĀJORĒGŌN GENIN. BURUGŌN TENNAN +GĀSIKANĒ +KUTARAGED +BABKI OSI WEKKI TIRINGAD, +BAB +HITTA KEMSIR DIGIRSUM. BELINOVSUM. TŌDNAN TINĒNGŌN JORENGŌN TĀSUM "+YA MUHAMMAD, BURUGI ATTĀSI." "WALLĀHI, AI IN +BELEDIR TEGKŌMENDINGI!" TEKKŌN +SAFAROSSUM, NOGSUM. IN +BELED +BARRIR JŪSUM. TAIMBŪNGŌN HASANGI NALSUM. HASANGŌN UWESSUM. MUHAMMAD ENGAD +RUDEKŌMNUM. GARA WĒ TOSKIGI UWENGAD, KEMSITTIR +RUDEKŌMNUM. "TĒGNU, +YA +SHEKH!" HASAN ISIGSUM. "ER MINNAI +ZĀLEBŪN?" ESUM. TEKKŌN WĒTIRSUM. "WALLĀHI, +YA HASAN, ENNA KĀCHIR BURU WĒR AGIN, +ĀDEMĪ KITTAGŌN ĀJURGŌN GENDAN ĀBELGŌN GENDAN BURUNAITŌN." HASANGŌN +HARTIMOSSUM IN BAINITKED. +WABURKI EGROSSUM TIN ESHĒKIR JŪRGI KUTOSSUM. KUTIRGI TENNA KĀGI OIRKŌMNUM KĀNA TONJILKANĒGED. ISIGIRINGŌN BUJŪSUM. KĀNAI JŪRGŌN BABKI JOMSUM. +BŌABKŌN "ER NI TERRĒ" ESUM. TEKKŌN "AI HASAN TER ERI" ESUM. "+SABURĒ, +SITTĪGI WĒTIRIMOKON!" +BŌAB BŌDIRGI JŪSUM. +SITTĪGŌN HASANNA TINĒNGŌN TINESIGŌN WĒTIJIRSUM. "HASAN BIDĀSUM AN." TIRGŌN WĒTIRSAN. "TĀREN" ESAN. TENN ĒN GUROSSUM +BASTOSSUM DIGRĪGIRIGI. +BABKI KUSIRSANN +WATTIGI TENN ĒNGŌN +SELLIM DOGOR TĒBINGŌN. HASANGŌN TŌJŪRGI +SELLIMIR KUJIRGI BURUGI KANDI WEKKI OSIRGI JOMSUM. BURUGŌN DIGIRIGI +ARDIR JŪSUM +SELLIMIRTŌN. HASANGŌN BELINOVSUM +MEDĪNA ŌWITTIGI ABIR.

6. BURUGŌN TENNAN KORN AGARKI +SUBAGED KOBEDIRGI. "AIGI +HAKĪMNAI OIJŪĒ!" +HAKĪMGŌN TĀSUM. TĀRGŌN "SARKIMEN!" ESUM. "BURUGI UGROS DIJIN +AHARRO BIKARIJIN." ESUM. KARJOSSUM. +HAKĪM BURUGI DOLOSSUM +HELO. BURUGI WĒTIRSUM. "TAIN ANNAN +EZAHĀNAR, ENNAN KOR +DAUA KINEKKI +UZĒN. ANNAI ODELĪ DIGRĪCHI; AI Ā+ĀDEMNUM." BURUGŌN. "ER AIGI MINGIR MANDO BUJŪR?" +HAKĪMGŌN "ER JUWARIGI SHUTĒ BITĀR." BURUGŌN. "SERĒM" ESUM. TĀSUM. +EZAHĀNAR TĀNGAD BURUGI +HAKIM ĀWĒTIRIN. "INDO KUCHA!" BURUGŌN "ER TEDDO +WALA INDO? +ĀDEMĪGI Ā+DAUE IMMĒ +EZAHĀNAR TIR ANDIGI +WALA KĀ TŪR?" +HAKĪMGŌN "WĒKAMNU, +DAUAN ARTIR DOGOR BŪM." BURUGŌN "SERĒM." ESUM. +HAKĪM TENNA ĒNGI +GIRISH IMIL WEKKI TIRSUM. "ER +ZAMANTŌN +HAMMĀMIR JŪKŌMNUM. JŪRGI ENNA +JITTAGI SHUKETAWĒ!" NOGSUM GUROSIRGI. HASANNAN ĒNGI ARED, KĀ

TŪGI ABIR TOROS, +HAKĪM +BABKI UNDURSKA KOBOSIN SHIRKOSGŌN GENIN. +BAB KOLODKI IKKAWINGŌN OIJOSSUM. BURUGI +BAB KOLOD +MARRAGI ARĒGI +ODA +MĀLA DOGORGĪ ABIR TĒBILLO OIJOSSUM. +HAKĪM BURUGI WĒTIRSUM. "ENNA KOR KARJOSSUM." ESUM. BURUGŌN. "ER ANNAN KOR KARJOSKŌKIM AIGI MINGIR ATTĀM?" ESUM. TEKKŌN "KOR KINATŌDĒR DESSIM" ESUM. "IN KOR TŌDKŌN AIGŌN EKKŌNNA BARĒNA DOLTĪ TER MA" ESUM. BURUGŌN "AIGŌN EKKŌN BARĒNA DOLTIGŌN MIN TERRĒ?" +HAKĪMGŌN WĒTIRSUM. "WERĒKODŌN KASHKIRGI TURBOSKIRŌN BIWAIOSIM." BURUGŌN "II ORIGBURIM" ESUM. +HAKĪMGŌN "KALGI BĪKALNĀ?" BURUGŌN "ILLA, KALGI BĪKALMENIM." +HAKĪMGŌN. "MINGI ER BĪKALIN?" BURUGŌN WĒTIRSUM. "ENNAI INDO KĀCHIR JOBORĪN DĀN AN" ESUM. +HAKĪMGŌN "ILLA, INDO DĀMNUM." ESUM. BURUGŌN "+HĀJA INGIRRĒGI KALMĒTO TERRĒ, WERĒKODŌN KASHKIKŌN GENDAN TURBAGŌN GENDAN." +HAKĪMGŌN "AI JŪRGI JOBORĪNIGI +SUGIRTŌN BETTĀRI." NOGSUM TENNAN +BAB KOLODINGARKI KUSKA KOBINGŌN BELOSKA. BURU TENN DOGOR AGOSSUM. +HAKĪM NOGSINN +AHARRO BURU +KURSIRTŌN IMBEL ĪGI KUTĒTĒBSUM. KUTĒTĒBIRGŌN +HAIŪRTAKKOSSUM, +BABKI KUSIRI ANDIGI MAROSSUM. ĀJORĒGŌN GENIN. ĀJORE-SINN +AHARRO, +SHEBBAKKI TENNA ĪGI JOMIRGI, TOGSUM. TOGOSIRGŌN +MĀLAN ESI TŪR JAKTOROSSUM. JAKTOROSIRGŌN ESI TŪR ĀBOWINGŌN +BARRAGI DURI AN. MARBŪNGŌN KAREGARILĪ WĒRI TILIGI AUFERANGŌN TILIGED ARETTĀSAN. KAREGARILĪ ARETTĀRGŌN TINNAN KUBTŌDIR ĪGKI ULOSIR KAKKIR ANDIGI BURUGI, TIDDOTŌN WĒKŌN TENNAN +DIFFĪYAGI BURUN DOGOR KUJIROSSUM ODNA SAKĒLĒ.

7. SHĀMI WEKKŌN TĀRGI. "GEL ARO WĒR IRGI NOGKŌMNUM" ESUM. KAREGARILĪGŌN "+WALA URUMĒ NOGKŌMNUM." SHĀMI BURUGI DOLOSSUM. DOLOSIRGŌN KAREGARILĪNĀI JŪRGI, +JAHADKATALĒRARGI BURUGI. "IN BURU ANDIM" ESUM. KAREGARILĪ "ILLA, ENDIMNUM." SHĀMIGŌN TENNAN +JĒBIRTŌN +BUNDŪKKI KINATŌDEKKI OSIRGI, KAREGARILĪ +NEBIS KOLODI WĒR NUTINGI +BUNDŪKKED JOMISĪR FOGORKIROSIR BURUGI AREN NOGSUM. BURUGI AREN TAIMBŪNGŌN, BURU TEKKI WĒTIRSUM. "WO SHĀMI, AIGI ANNA JITTA Ā+NAFIDĒN, ENNAN +JAKETTA DĒN!" SHĀMI TEKKI TIRSUM. "SHĀMI AIGI ANNA OSICHI OROKOS, ENNAN KORSIGI DĒN!" SHĀMI "SERĒM" ESUM. "SHĀMI AIGI ANNA UR OROKEBŪM, ENNAN +TARBŪSHKI DĒN!" SHĀMI TIRSUM. "SHĀMI, AI MARSOSIM, ENNAN KAJKI DĒN!" SHĀMI "SERĒM" ESUM. BURU KAJKI EGIRESSUM. SHĀMI TEKKI WĒTIRSUM. "WAIYE ODDIKIR +SŪGMENU, EKKI BIDIGIRKIDOSSIN." "ER OLGŌN BIBANGŌN GENĀ? WO DOBBO UBURTI!" IKKE DIDOSIRGŌN, TENNAN KAJKI +KURBAG WEKKI JOMSUM. KAJKŌN BŌDOSSUM. SHĀMIGŌN +LIBTIRGI KAREGARILĪNĀI JŪSUM, JORENGŌN +ZĀLENGŌN. "+IFRĪT ANNAN KADECHĪGI DUKIDESSUM! +IFRĪT ANNAN KORSIGI DUKIDESSUM! +IFRĪT ANNAN TARBŪSHKI DUKIDESSUM! +IFRĪT ANNAN KAJKI DUKIDESSUM!" KAREGARILĪGŌN TEKKI WĒTIRSAN "WO DOBBO UBURTI! ER ININ DOGOR KŌSKON EKKI TIRĀ?" ESAN.

8. BURUGŌN TENNAN KAJKI EGRETAININGŌN +MEDĪNA WERRO JŪSUM, +MEDĪNANAN ORKŌN DIOSUM. +BELEDNAN +ĀDEM MALĒGI +ZAZŪR URUME WEKKI ATTĀR EBIROS +TALGESAN. +ĀDEMĪ DOGOR +ZAZŪRKŌN +BELEDĪCHI DOGOR TĒBMĒTŌKA, BURUN EGITTIGI JŪKA, TĒBKIN. +ĀDEMĪ +BELEDĪCHIGŌN JŪKA, +ZAZŪRKI +SUGOS-

IRAN. WEKKÖN +ÂDEMIRTÖN +ZAZÛRKI AREDIRGI KĀ TÛR TOROSSUM. +ÂDEM MALĒGI +BELEDICHĪGI BURUN EGITTIGI EBIROSIRSAN. +SHEBBAKKI KUSIRGI +ZAZÛRKI +TALGENGAD BURUN EGITTIGI UR DOGOR JÛRGI TĒBSUM. WIDĒ +ÂDEM +MEDĪNANDĪCHI MALĒGÖN WERĒKODÖN +SAHHAKUJIRSAN BURUGI ORKIRARKI. BURUGI ORKIROSSAN.

ORKIROSSANN +AHARRO, IN +ÂDEMĪGI +ÂSOWIREL WEKKI BIRIGSUM. JÛSUM. TEKKE ÂSARKINGÖN, BURUGI +MELIKA TERM ANDIGI. BURUGÖN ISIGSUM +ÂSOWIRELGI. “ËR AIGI +ADELKIR BI+SOWIRĒNĀ?” ESUM. +ÂSOWIRELGÖN “ËYO! +ADELKIR BÛSIRI!” ESUM. BURUGÖN “SERĒM” ESUM. BURU TENNAN KADECHI MALĒGI DUKOSSUM WIRJOS +HĀLASIR. TENNAN KAJKI AREDIRGI TĒBIN. +ÂSOWIRELGÖN WĒTIRSUM. “EKKE IKKE WIRJIBÛLGÖN +ÂSOWIRĒRI?” TEKKÖN “ËYO!” WESUM. WIDĒ BURU ISIGSUM. “ENNAI AFFI DĀNĀ?” ESUM. +ÂSOWIRELGÖN WĒTIRSUM. “OGLI WĒRI BURU WĒR DAN.” “WO, ENNAN ĒN AIBÛNĀ?” “ËYO” ESUM. BURU IKKE AGISIGI +ÂSOWIRELGI “WO, ENNAN KĀ ENNAN KIDIRĒ? +WALA DUGUGI AGOSKIRIN?” +ÂSOWIRELGÖN WĒTIRSUM. “DUGUGI AGOSKIRRI.” ISIGEDIRGÖN BURU WĒTIRSUM. “+SHAHIRRO ENN AFFĪCHI MUKOTIGI ĀKALAN?” ESUM. TEKKÖN “+GIRSH IMIL WĒRM” ESUM. “AĪGI +SOWIRĒ +ADELKIRIGI!” IDKÖN “SERĒ, YA MELIKA!” ESUM. +SOWIRESSUM. BURU +MELIKA GUROSSUM, +BASTOSGÖN GESSUM. TENN +TASWĪRA +ADELANINGAD, +ÂSOWIRELGI “NOG!” ESUM. +ÂSOWIRELGÖN NOGSUM. +ÂDEMĪNAN URKI ÂMERTIJIRILGI UWESSUM BURU +MELIKA. UWIRGI WĒTIRSUM. “MAN IDNAN URKI JÛRGI MER ETTĀR!” IDKÖN URKI JÛRGI MERESSUM. TENNAN +TASWĪRAGI +BĒABKI UWIRGI TIRSUM. “INGI OJJURGI KANAN KATARĒR KOKKOSSU.” +ÂSKAR WEKKI BIRIGSUM. BIRGINGAD TĀSUM. +ÂSKARKI WĒTIRSUM. “IN +TASWĪRA +JEMBI TĒBOSIRGI, +ÂDEM TĀRGI +TASWĪRAGI URURGI BAINILGI ARETTĀR ANNAI!” +ÂSKARKÖN “SERĒM” ESUM. TĒBINGÖN +ÂSKAR +TASWĪRA GUBALLO, MUHAMMAD +GÛBA TĀRGI +TASWĪRA URURGI “IN BURUN GARI AIGI JAKIKOSSUM.” +ÂSKARKÖN AREDIRGI NOGSUM KĀCHIKIR, BURU +MELIKAGI OJJUTIRSUM. “IN IKKE WENGAD, AIGÖN ARETTĀSIM.” +MELIKAGÖN. “OJJÛ +HABSÖS!” ESUM. +ÂSKAR WIDĒ BIDĀSUM +TASWĪRANAL. MUHAMMAD GÛBANAN TINĒN TARGI +TASWĪRAGI URURGI BAINSUM. “IN BURU +JISSI ANNAN TÖDKI DOSHKIRSUM.” +ÂSKAR AREDIRGI NOGSUM BURUNAL. “+HABSÖS!” ESUM, “TENN TÖDNAL” OJJOSSUM +HABIS TÛR. +ÂSKAR BIDĀSUM TENN +TASWĪRANAL. +HAKĪM TĀRGÖN. “A! YA! IN BURU TER GALIG DĀMNUM! AI +DAUYEGÖN GESSIM, TEKKE SAIGED NALEDIRGI?” +HAKĪM IKKE WESUM. +ÂSKAR AREDIRGI NOGSUM +MELIKANAIR. +HABSÖSSUM. +ÂSKAR BIDĀSUM +TASWĪRANAL. +SHĀMIGÖN KAREGARILĪGÖN TAIMBURANGÖN +TASWĪRAGI NALOSSAN. NALOSIRGI +SHĀMI DOSHANOSSUM. DOSHANOSIRGÖN “IN +IFRĪT ANNAN KADECHĪGI ARESSUM. IN +IFRĪT ANNAN KORSICHĪGI AREL TERUM. IN +IFRĪT ANNAN +TARBUSHKI AREL TERUM. IN +IFRĪT ANNAN KAJKI AREL TERUM. ADINGÖN TER TER Ā, ANNAN KAJKÖN ARKAGIN!” +ÂSKARKÖN AREDIRGI SHĀMIGÖN KAREGARILĪGÖN OJJOSSUM +MELIKANAL. +MELIKAGÖN “OJJÛ +HABSÖSIR!” ESUM. +HABSÖSSUM. +ÂSKAR BIDĀSUM +TASWĪRANAL.

9. TĒBINGÖN HASAN TĀSUM. TĀRGÖN WARĪRTÖN URUSSUM. TENNAN ĒN TER

ENGI OIROSSUM. OIROSIRGŌN ĀJORĒ GULUBN OIGI. AGOIĒ, +MANDĪLGED ORMOSSIGI ĀKOSMĒN. ĀKOSMĒ +GAHWAR JŪRGI TĒGOSSUM. BURUGI URUKA JORENGŌN +TASWĪRAGI +WALA TENNAN TŪNDIGI WEKKI ATTIRMUN, +ASKARKŌN WĒTIRSUM "ENNAN TŪNDIGI AIGI DĒN!" HASANGŌN WEROSIRSUM +ASKARKI. +ASKARKŌN GIJREDIRGI ARENNOSSUM +MELIKANAIRIGI. +MELIKAGŌN. "OIJŪ +HABSŌSIR!" ESUM. +HABSŌSIRGŌN. "MUHAMMAD +GŪBAGI ARETTĀR!" AREDJŪTIRSUM. ISIGSUM. "ER MINĒ TERGŌN, UGROSKI MAN BURU +HAMMĀMIR DĀBŪNGŌN, ĀWĒTIRUN FELATTIKANĒGI? HASANGŌN ER TĀRGI WĒTIRSUM. HASAN AIGI JŪRGI KANDIGED SHEGSUM." +GŪBAGŌN. "ILLA, AI IKKE WĒKŌMENIM." TEKKŌN "ILLA, ER IKKE WESUM." ESUM. +ASKARKŌN UWISUM. "TINĒNGI ARETTĀR!" ESUM. OJJUSŪM +MELIKANAI. OJJŪNGAD ISIGSUM. "ER ANN DOGOR USUSUN. TERGŌN UGROSKI +HAMMĀMIR ERKANĒ WĒR DĀN ANDIGI AIGI OJJŪSUM. OIJŪRGŌN +BABKI KUSIRGI +HAMMĀM TŪR AIGI UNDUROS KOBOSSUM. NOGSUM." +ASKARKI UWESSUM. "ĒNDIGI +FEHMEDIRGI, +ASKARKŌN JŪRGI SHĀMIGI ARETTĀR!" SHĀMIGŌN KAREGARILĪGŌN AREDJUSUM MELIKANAI. +MELIKAGŌN ISIGSUM SHĀMIGI "ER MINNAI KAREGARILĪGI JOMU +BUNDUKKED?" SHAMIGŌN "BURUGI NALOSIRGI JOMSIM!" ESUM. +FEHMEDIRGI SHĀMINDIGŌN KAREGARILINDIGŌN +HAKĪMGŌN UWESSUM. JŪSUM. "ER ANNA KOR KARIJBŪNGŌN AIGI ENNAN KĀCHIR OIJŪSUN. MURSAGED OIJŪNGAD BURUGŌN ENN DOGOR USUSUM." HASANGI UWESSUM. HASANGŌN JŪSUM. +MELIKA HASANGI ISIGSUM. "ER AIGI MIN ENNAN +SIBĀBIR AIGI KANDIGED SHEGU?" HASANGŌN WĒTIRSUM. "+YA +MELIKA! AIGI MUHAMMAD +GŪBA WEDESUM" ESUM. MUHAMMADKI ISIGSUM. "ER HASANGI WĒTIRMĀ?" MUHAMMADKŌN GUBOSSUM. HASANGŌN TEKKI MUHAMMAD +GUBAGI "ER AIGI WEDESUM" ESUM. BURUGŌN +SADIGASUM HASANDIGI TER WERĒGI. +MELIKA +HAKĪMGŌN SHAMIGŌN MUHAMMADKŌN TINĒNGŌN KEMISKI ĪGIR JUGORIGI TURUGIR SILESSUM. KAREGARILĪGŌN KĀCHIR TENNAI +GAFĪR KIROSIRSUM. HASANGŌN TENNAN ID ANOSSUM +MELIKANOSGŌN GESSUM. AIGŌN TINNAI ERINGŌN JŪRGI DUGU KOCHI WEKKI KAWETĀSIM.

ENGLISH.

1. I will tell you a story against yours, a long story. ("God is generous!"¹) There was a man and a woman, and when they were married a son and a daughter were born. And the father grew old. Of these rich people the father said to the son, "If you listen to me, when a man comes to you, refuse to drink (even) a cup of coffee with him. As for me, I will die either to-day or to-morrow. I give you this warning as it were from God." So saying, the father died. After his father's death, the son took a handful of money (*lit.* an end of the money) and went out. He went riding in a carriage and passed some of his friends, who called him, "Hasan!" And he cried, "Ahoy!" "Come here! come and drink coffee!" But he said, "I don't want to," remembering what his father had said

¹ Said by listeners.

to him, and went on his way. But his friends took him by force, and went right into the coffee-shop, and called the shopkeeper. They inquired what Hasan would drink. Hasan said, "Bring me a cup of coffee!" When he had drunk their coffee Hasan said, "I will go to my house." "Come to-morrow!" they said. "To-morrow we will go out together, when will you come?" Hasan said to them, "I will come in the afternoon, at two o'clock." He went to his mother's house. From his father's money that was there he took a handful, and after two o'clock went to his friends. Those people roasted a sheep in butter and brought the meat. They drank wine and ate meat, and when he came Hasan said to them, "How much did these things cost?" His friends said, "Hasan, why are you angry with us the very first day?" Hasan said to them, "No, by God, tell me!" He paused. His friends said, "It cost two hundred piastres." Hasan gave them these two hundred piastres. Having had the laugh over him, they departed. He went to his house and sought for his father's money, but though he turned everything upside down he did not find it. His mother and his sister had gathered up all the money, and dug a hole and buried it. They had the advantage of him (*lit.* they rested over him). Hasan was angry with his mother and sister. Being angry, he said to his mother, "I will work as a porter; give me patched clothes and rags of sacking!" And the boy put sacking on his back and went out. As he went along his friends said, "You porter boy, are you disengaged?" "Yes," he said. "Come here!" And he came. They loaded a sheep on his shoulders, and when he took it, they said to Hasan, "Carry it to the garden!" they said. When he was carrying the sheep on his shoulders, a vulture bit and tore off its hind-leg and made off. Hasan was angry. He carried it to the garden. His friends came and were angry. "Dirty cinder! where is half the sheep? You are a thief!" They slapped him. Hasan began to weep. One of his friends said to the others, "You pimps, you have enjoyed all Hasan's money. Do you, each of you, give him a hundred piastres! If you don't give him it, I will cut off your heads with a knife." They, ten souls in all, each gave him a hundred piastres. Hasan went to his mother's house and shared half the money with her. He said to his mother, "I won't stay in this village. The blows and tears I got to-day are enough for me. I will go. See, I am gone!"

2. He went to a city. One day when he was staying there, he went abroad. He filled a skin with water, and took two brass bowls and put (the skin) under his armpit. "I will dispense alms for my father." He went off taking the skin. A king's daughter passed. "Give me a little water!" she said. The girl drank, was pleased with the water, and departed. A soldier said to Hasan, "Give me a little water!" Hasan replied, "Yes, sir!" The soldier drank, rejoiced, and ran to tell the king. "A Cairene is giving water as it were from God to the people. By the favour of God his water is delicious." The king said to the soldier, "Go and bring the water-carrier!" And he made some golden bowls and went to the king. When he came to the king, "Bring a little water!" said he. The water-carrier poured into a golden bowl and gave.

He drank. "Bring another!" he said. And he gave it to him. The king said to him, "What is your country?" Hasan said, "I am from Cairo." The king asked him, "Why have you come here?" Hasan told all that had befallen him. "And my father is dead," he said. The king said to him, "Your father lent me a treasure chest. Since your father is dead, do you take it!" Hasan said to him, "I won't take it now. After four years I will finish my father's charity and come and perhaps take it." Hasan went and completed his father's charity, and after four years went to the king. The king said, "O, Hasan, take your father's money!" The king was pleased, and rejoiced and gave Hasan a palace.

3. Hasan loved that maiden, he loved her very much. He asked a witch, "Can you bring me the king's daughter?" "I can bring her, but I will bring her and dye her black and send her to auction. When she is sent, if the king bids a hundred dinars for her, do you bid three hundred!" Saying this the witch went to get the princess. She made a crock a railway train, mounted it, placed it on the line, and started to get the princess. She went to the king's country, and descended opposite the city. She took her crock from the line, placed it on the ground, and made it a victoria. She inquired for the king's house. She went and found the doorkeeper. She asked the doorkeeper, "I want to see the queen." The doorkeeper said, "Wait till I go and ask the ladies." The witch said to the doorkeeper, "Say to the queen 'A daughter of your brother is here.'" The doorkeeper went up and told the queen, "A daughter of your brother wants to come to you." The queen said, "Let her come!" The witch entered, and saluted the queen and princess. She asked the girl's mother, "Is your daughter single or married?" Her mother said, "Single." The witch said, "No, your daughter is married." The girl's mother said, "No, she is not married." The witch said, "Lay bare her belly and look!" Her mother lifted up her clothes and looked at the girl's belly. There was a child. The witch had bewitched the girl, and when she was bewitched she became pregnant. The mother began to weep for fear of the girl's father. The witch said, "Fear not!" The mother said to her, "Come, witch, take her away with you lest her father come and see her. Take her to some country, and when she has brought forth bring her to us." The witch said, "That is the best way." The queen gave the witch four hundred guineas. And the girl took with her her ornaments and money and all her possessions. She and the witch departed. They mounted the victoria. When they came beside the railway line they descended, placed the crock on the line, mounted and started. They went on the line to Hasan's country and descended. The witch and girl remained together. The witch took the girl to her house and dyed her like a negress. When she had dyed her, she brought her to the market and offered her for sale. The king who had given Hasan the palace, and another king, and Hasan, made bids for the girl. The kings asked, "Are you selling this slave?" The witch said, "Yes." One of the kings bid one hundred dinars, and the other two hundred. The kings teased Hasan: "Yesterday you were carrying a waterskin on your shoulders. Why have you come to outbid us?" Hasan said to the witch,

"Will you sell her for five hundred dinars?" She said, "You have gained." Hasan took his slave and went home: he did not know whether she was black or white. He took her to the palace, and both remained together. Hasan saw the girl's face was black, and was angry. Being angry he slept apart from her all night. At dawn (*lit.* when the world was visible), he asked the king, "Give me a soldier!" The king said, "Good." When the soldier came he gave him the slave to conduct her. "Take this slave to my mother at such and such a house in Cairo!" Hasan sent them off.

4. The soldier took train and rode on it, and came to the country of Hasan's mother. He descended from the train, and asked the people where the house of Hasan's mother was. The people said, "See, here it is!" The soldier took the girl, went there, and knocked at the door. When he knocked, "Who are you?" said Hasan's mother. "It is I," said the soldier. They opened the door and he entered the house. Hasan's mother and sister and the girl greeted one another, and the soldier said, "I give you the girl sent by Hasan." Hasan's mother said, "We are mourning. Hasan's father has just died. Why does he send me negresses to work?" His mother was angry. The soldier departed. The girl remained on the stairs (outside the house) day and night for ten days. The little money belonging to Hasan's mother and sister failed. She used to go and buy a little loaf for their meal, and put it under her skirt (*lit.* legs), and give her daughter half and ate half herself. Nor did they give the negress, who had been ten days on the stairs, a little bit of anything to eat. The negress was about to die from hunger; she took ten dinars from her pocket and gave them to Hasan's mother, and said, "Take this, go and buy and bring something to eat!" Hasan's mother rejoiced, seeing the money. "O, my daughter! is it you that is come here?" She said, "Yes." She went and brought a hundred mahbubs (gold coins), and gave besides a hundred dinars. Hasan's mother rejoiced, seeing much money. The negress and they became happy; they got on exceedingly well together. The negress gave them two hundred dinars, saying, "Repair your palace!" They repaired it like the king's. The girl took a carriage and came to a house-painter's. "O, uncle, adorn our house beautifully and finely!" He said, "All right." They built the house beautifully and finely, and three or four days later the girl and Hasan's mother and sister were sitting talking together in it.

5. The girl said, "I will go to the bath." Hasan's mother and sister said, "How long it is since we have been. We will go together." "Very good," said they. They got a carriage and rode in it. They got her clothes, which had been at a tailor's to be sewn, and were finished. They went to the bath and entered into it. The rubber at the bath was a woman, and when she rubbed the girl with palm fibre, the black girl became white. The bathwoman had a son; he was Muhammad Scabby. Those, Hasan's mother and sister and the girl who had been black, departed. The bathwoman's son, Muhammad Scabby, came to his mother and said, "By God, mother, if you don't get me that girl who became white when she was washed, I won't stay in the village!" And he wept. She said to him,

"I will go and get her for you, she lives near by." She went to get the girl whom Hasan had sent. She went to Hasan's house and knocked at the door. They said, "Who are you?" "It is I," she said. "Come in!" said they. She came into the house and said to the girl, "When you were in the bath everyone praised you. All the king's daughters there said there is a wedding, and you must come."¹ The girl said to Hasan's mother and sister, "Come, we will go together!" They refused. "We will not be able to go." She rode in her carriage alone and came to the bath. The woman opened the bath, pushed her son in, and locked the door. The boy's mother took the key and went off. The boy came inside to the girl. "O, scabby boy, what do you want?" The girl thus abused him. "Now your mother, nasty cinder, filth, has done this to me." Muhammad Scabby said, "I will die for your sake." The girl said, "What do you want?" He said, "Come in here!" The girl said to the boy, "Why am I to come!" He said, "Come, let us play together a little." The girl took the bathstool and gave him one on the head. The boy cried. The girl kept striking him, and he wept and cried for his mother. When the girl kicked the door in the intensity of her unwillingness, the door fell in four pieces. She went right off.² The boy's mother came weeping: "O, Muhammad, I brought the girl." "By God, I won't stay in this village." He started and went. He went to that country abroad, and as he was going along he saw Hasan. Hasan spoke; when he spoke Muhammad did not answer. Three times he spoke to him, to the fourth he made answer. "Shut up!" Hasan asked him, "Why are you angry?" He replied, "By God, Hasan, there is a girl in your house, and all men keep going in to and coming out from that girl." Hasan grew wroth at this speech. He got on a train and went to his country, and descended. When he descended he did not know his house for its beauty. He inquired where to go. He went to the house and knocked at the door. The gatekeeper said, "Who are you?" "I am Hasan," he replied. "Wait till I tell the ladies!" The gatekeeper ran and came and told his wife and Hasan's mother and sister: "Hasan is here." They said, "Tell him to come!" His wife was glad and rejoiced exceedingly. When he opened the door his wife was on the stairs. Hasan entered, went up the stairs, drew a knife and struck his wife. The girl came falling to the ground. Hasan went right away to the other city.

6. The girl stopped up the place of the wound with her finger. "Take me to the doctor!" The doctor came. "Do not fear," he said; "I will heal the girl after five days." When he had healed her, the doctor loved the girl exceedingly. He said to the girl, "Come to my dispensary; your wound needs a little medicine. I have many sick folk, and my time is occupied." The girl said, "Why do you send me there?" The doctor said, "You can come and go quickly." The girl said, "It is good," and came. When they came to the dispensary, the doctor said to the girl, "Come up here!" The girl said, "Will you be there or here? Do

¹ After a Cairene wedding, the ladies of the families concerned generally make an excursion to a bath.

² A similar escape is recorded in Spitta Bey's *Contes Arabes Modernes*, tale vi.

you give people medicine in the dispensary or in the house?" The doctor said, "Don't talk, the medicines are up above." The girl said, "Good." The doctor gave his wife a hundred piastres. "You have not gone to the bath for a long time. Go and clean your body and come back!" She went rejoicing. Taking Hasan's wife and entering the house, the doctor opened the door, shut and locked it. He brought her thus through seven doors. He brought the girl within seven doors to a room over the sea. The doctor said to the girl, "Your wound is healed." The girl said, "If my wound is healed, why have you brought me here?" He said, "Your wound is still a little green. This little wound is love between you and me." The girl said, "What love shall there be between you and me?" The doctor said, "If we sleep together, you will get well." The girl said, "I am hungry." The doctor said, "Will you eat bread?" The girl said, "No, I won't eat bread." The doctor said, "What will you eat?" The girl said, "Have you melons here in the house?" The doctor said, "There are none here." The girl said, "If I eat something sweet we will seek each other and sleep together." The doctor said, "I will go and get melons from the market." He went. He opened the sevenfold door, closed it, and went off. The girl tricked him. After the doctor had gone, the girl rose from her chair and stood up. When she stood up she was at a loss. She could not open the door, and wept. After she wept, she struck the window with her hand and broke it. Breaking it, she dived into the sea. Diving, she swam in the sea to reach the shore. Being unable, some fishermen were casting nets. They caught her with the net. Having caught her, they kindled a fire in their little boat to warm the girl. One of them put his cloak on the girl, fearing the cold.

7. A Syrian came. "Has a white gazelle come to you?" he said. The fishers: "No, nor a black one." The Syrian loved the girl. Falling in love, he went and quarrelled fiercely with the fishers, saying, "The girl is mine." The fishermen said, "No, she is not yours." The Syrian pulled a little gun from his pocket, gave each of the seven fishers a shot, lamed them, took the girl and went off. As he took the girl and was going along, the girl said to him, "Syrian, my body is frozen; give me your jacket." The Syrian gave it to her. "Syrian, my feet are cold; give me your shoes." The Syrian said, "Good." "Syrian, my head is taking a chill; give me your fez." The Syrian gave it. "Syrian, I am tired; give me your horse!" The Syrian said, "Good." The girl rode the horse. The Syrian said to the girl, "Don't hurry him badly, he will throw you." The girl said, "Will you still keep talking, you dirty cinder!" Thus abusing him, she gave her horse (a blow with) the whip. The horse ran. The Syrian turned and went to the fishermen, raging and weeping. "A devil took my clothes; a devil took my shoes; a devil took my fez; a devil took my horse." The fishermen said to him, "You dirty cinder, they gave you more than that."

8. The girl came riding on her horse, and went to a city. The king of the city was dead. All the people of the city brought a black bird, gathered together, and let it go. The bird did not stop over the townsfolk; it went near the girl and

stopped. The townsfolk stirred up the bird. One of the people took the bird and went into a house. All the people of the city gathered near the girl. They opened the window, released the bird; it went near the girl and settled on her head. Then all the townspeople agreed together to make the girl queen. They made the girl queen.¹ After they made her queen, she demanded a painter. He came; he was afraid because the girl was the queen. The girl asked the painter, "Will you paint my portrait finely?" The painter said, "I will bring it out well." The girl said, "Very good." The girl doffed all her clothes: she was quite naked. She stood up, holding her horse. The painter asked, "Am I to depict you naked like that?" She said, "Yes!" Then the girl asked him, "Have you a child?" The painter said, "There is a boy and a girl." "Is your wife alive?" "Yes," said he. The girl thus asked the painter, "Is your house your own property or do you pay rent?" The painter said, "I pay rent." Continuing to ask him questions the girl said, "How much do your children eat in a month?" "A hundred piastres," he said. "Paint me nicely!" The man said, "Very good, O queen!" He painted her. The girl queen was happy and contented. Her portrait having come out well, she told the painter, "Go!" The painter went. The girl queen asked for the man who cuts off people's heads. Asking for him, she said, "Go and cut off that man's head!" The man went and cut off his head. She sent for the gatekeeper and gave him the picture. "Take this and fasten it on the palace wall!" She demanded a soldier. Being demanded, he came. She said to the soldier, "Stay by the picture! Bring me anyone who comes and looks at and talks about the picture." The soldier said, "Very good." Muhammad Scabby came and looked at the picture. He said, "That beast of a girl hit me." The soldier took Muhammad to the house and brought him before the queen. "When this man spoke this I took him and brought him." The queen said, "Imprison him!" The soldier returned to his picture. Muhammad Scabby's mother came, looked at the picture, and said, "That sort of girl made a fool of my son." The soldier took her and went to the queen. "Put her in prison with her boy!" she said. They put her in prison. The soldier returned to his picture. The doctor came: "That's the girl—there's none like her. I gave her medicine. Where can I see her?" The doctor spoke thus. The soldier took him and came to the queen. She imprisoned him. The soldier returned to his picture. The Syrian and the fishers passed, and saw the picture. When he saw the picture the Syrian went mad. Being mad, he cried, "That devil stole my clothes. That's the devil that stole my boots. That's the devil that stole my fez. That's the devil that stole my horse. That's her herself, and she is holding my horse!" The soldiers took the Syrian and the fishers and brought them to the queen. The queen said, "Imprison them!" He put them in prison. The soldier returned to his picture.

¹ A similar incident occurs in the story "Pauvre Ali, Heureux Mohamed," in the Marquis de la Rochemonteix's *Quelques Contes Nubiens*. Cf. also the mode of selection of the King of Gingo. Bruce's *Travels in Abyssinia*, vol. ii, p. 324.

9. As he stood there, Hasan came. He came and saw it from afar, and knew it was his wife. When he knew he wept and sobbed great sobs, and wiped his tears with his handkerchief. Wiping them away, he went into a coffee-house and sat down. Because he wept on seeing the girl's picture, nor told his thoughts (*lit.* what was in his belly), the soldier said to him, "O, clever one, why do you weep?" Hasan said, "I weep because I am alone." The soldier said, "Tell me your thoughts!" Hasan told the soldier. The soldier listened, took him and went to the queen. The queen said, "Take him, and imprison him! When you have put him in prison, bring Muhammad Scabby!" He brought him. She asked him, "Are you he who proposed adultery the day that girl was in the bath? And you went and told Hasan, and Hasan came and stabbed me with a knife." Scabby said, "No, I didn't tell him so." She replied, "Yes, you did say so!" She sent for the soldier. "Bring his mother!" she said. He brought her to the queen. When she was brought, she asked her, "You tricked me that day? You were she who brought me to the bath (saying) there was to be a marriage? Who, having brought me, opened the door, pushed me into the bath, shut it and went?" She sent for the soldier: "I understand about the woman; go, soldier, and fetch the Syrian!" He brought the Syrian and the fishers to the queen. The queen asked the Syrian, "Why did you shoot the fishers?" The Syrian said, "I saw the girl and shot them." Having understood about the Syrian and the fishers, she sent for the doctor. He came. "You brought me to your house when my wound was healed. When you brought me by a lie, the girl had the laugh over you." She sent for Hasan. Hasan came. The queen asked Hasan, "Why did you stab me with a knife?" Hasan said, "O, queen, Muhammad Scabby told me to." She asked Muhammad, "Did you tell Hasan?" Muhammad denied it. Hasan asked him, Muhammad Scabby: "You told me," he said. The queen believed Hasan's story. The queen burnt the doctor and the Syrian and Muhammad and his mother, all four in a fire, and scattered them to the wind. She made the fishers watchmen to her house. Hasan became her husband, and he became king. I too was with them, and got a handful of money, and came.

THE EXPERIMENTAL INVESTIGATION OF FLINT FRACTURE AND ITS APPLICATION TO PROBLEMS OF HUMAN IMPLEMENTS.

By S. HAZZLEDINE WARREN, F.G.S.

[WITH PLATES XXXVIII-XL].

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PART I.

1. INTRODUCTION.

THE subject of the present communication is one which has not yet advanced beyond the stage of controversy. It is unfortunate that those who are the most entitled to judge in this matter are at considerable divergence among themselves with regard to conclusions which are of far-reaching importance.

It appears to me that an investigation of the elementary principles which underlie all flint chipping is no less important for the solution of the problems that are before us, than is the investigation of the structure of organized beings to the

solution of the problems of palæontology. This view is by no means universally held. But even although we may not yet have succeeded in unravelling the essential from the tangle of the accidental, and many present mistakes may have to be corrected, I believe that this method will ultimately be recognized as the only one compatible with the broader philosophy of science.

2. OBJECTIONS AGAINST THE VALIDITY OF FLINT EXPERIMENTS.

If we knew nothing of the matter, and were shown a perfect crystal of a diamond and a rough piece of broken brick, I think we should imagine that there was more evidence of human design in the crystal with its perfect regularity of form and its polished facets, than there was in the brick. Where problems of human implements are concerned let us take warning lest we mistake the diamond for the brick.

I think it must be admitted that it is not satisfactory to base our judgment upon some vague intuition of that which we suppose should, or should not, constitute a genuine flint implement. And yet there are many workers who feel much inclination to discredit flint experiments. In my opinion this mistrust in flint experiments has arisen because these experiments have been approached from a mistaken point of view.

Experiment should hold a similar position in these problems to that which it holds in physics or in chemistry. It has been objected against the validity of flint experiments that the means employed to obtain an application of force are artificial and do not exist in Nature. Yet one has never heard a similar objection against the discoveries of physics or chemistry, on account of the apparatus and machinery which alone make those discoveries possible.

I think the explanation lies in the fact that in the problem before us there has not always been sufficient clearness of thought in distinguishing the experiment from its application.

It has been assumed, when a certain experiment has failed to produce a given result, that Nature is equally unable to produce that result when bringing into play her varied and powerful agencies. This is as unsound as it would be to assume that the result of a certain experiment must also be reproduced by natural agencies, without evidence that similar conditions exist in Nature to those employed in the experiment.

As I have pointed out before, there are two most important factors which prohibit the experimental reproduction of natural conditions: namely, (1) the quantity of material operated upon, and (2) the time during which the forces of Nature are acting upon it. Experiment can neither reproduce natural conditions, nor can it directly show the product of those conditions.¹

¹ I have elsewhere criticized the experimental methods of Mr. J. Reid Moir, see *Man*, 1913, 20; *Geol. Mag.*, 1914, p. 546.

The first purpose of flint experiments is the investigation of the physical properties of flint and its behaviour when subjected to various stresses. The second purpose is educative; to train the eye of the student in the recognition of the characteristics of the chipping produced by different methods. It is by experiment only that such knowledge can be gained; while without such knowledge there can be no scientific understanding of flint fracture.

Although experiments are not in themselves a reproduction of natural conditions, a little consideration will show that each class of experiment has its own value. For instance, the effects of cart-wheel crushing upon new roads have the merit of being absolutely fortuitous: there is no selection in the raw material used; neither are the flints placed in chosen positions when the force is applied.

At the same time, this indefiniteness, and the uncertainty in the force which may have come into play, have their own disadvantages. In order to understand this simple operation of cart-wheel crushing, it is necessary to experiment with flints of chosen shape, and to place them in definite positions against other stones when the force is applied, in order to discover how the edge-chipping takes place, and why it occurs in some instances and not in others.

3. THE CONDITION OF THE MATERIAL.

If a flint be dropped upon a hard surface, it may instantly fly into a large number of angular fragments. This is a flint which has become intersected, throughout its mass, by incipient fractures. These flaws are most commonly the result of the molecular strains set up by rapid changes of temperature (thermal fracture). If this process has proceeded far, it is not possible either to flake the material by hand, or chip it by any process of concussion or pressure, except along the lines of its own incipient shattering.

If another flint be subjected to a similar force, it may be found that although the process be repeated many times, no result is obtained beyond a slight bruising or contusion of the surface. This is because the flint has become toughened or annealed, and, to a considerable degree, resistant to fractures of any kind.

If a third flint be tried, it may be found that on the first or second trial a neat "bulbous" chip will be detached, leaving a concave facet behind it upon the stone. This is a flint in that which I propose to describe as a "flakable" condition.

The best flint for flaking purposes is that which has been freshly taken out of the chalk. Fresh flint, however, varies in flakable quality; that obtained from certain beds in certain districts being superior to the average.

Flint in perfectly flakable condition may, however, be found abundantly in many of the Pleistocene gravels, and other superficial drift deposits.

The variation in the flakable quality of different flints introduces great complications into the results of all experimental flint chipping. In the experiments

which I am about to describe, a considerable variety of raw material has been used, but, unless expressly stated to the contrary, it is always drift flint. This has been collected from a considerable area of country over Hampshire, Kent, Middlesex, Hertfordshire, Essex, Lincolnshire, and elsewhere. The general results do not refer to the flint of any one locality, which may be especially favoured or otherwise.

4. THE FORM OF THE MATERIAL.

Not less important than the quality of the raw material to be used in flint experiments, is the consideration of its form. Throughout all flint experiments, it is no less true with respect to form than it is with respect to condition, that an effect which is inevitable upon one piece of flint is unobtainable upon another, either by the same or by any other mechanical process.

As it is not possible for the experimenter to work upon the raw material in bulk—indeed it would only lead to confusion if he did—it is essential for him to select his raw material into groups according to form, such as, cylindrical, pseudo-spherical, tabular, plano-convex, and the like. If we wish to know the effect of a mechanical force upon a flint, it will lead to false results if we take one belonging to a different group as our guide.

Although flint is always uncertain, the results obtained upon each group tend to follow certain definite lines, which, broadly speaking, can be clearly laid down.

It will thus be understood that it is of little value to give the proportion of successes to failures obtained in any process, as this proportion depends upon the selection of the raw material which may be used.

In obtaining raw material for flint experiments, it is possible to select, at will, that which will give 100 per cent. of failures, or that which will give between 50 and 100 per cent. of successes.

If I may anticipate a point in the application of experimental results to natural conditions, Nature does not select out the “suitable” raw material and preserve it from coming under the operation of her agencies, but all classes are subjected to the same forces, and that which is “suitable” alone receives its appropriate chipping.

5. THE PLANES OF LEAST RESISTANCE.

In attempting to reproduce imitations of prehistoric flint implements, the first thing that is discovered is that flint fractures along certain planes of least resistance. Along these planes, good flakes may be struck off with facility, while in other directions the flint may be battered repeatedly, and by more forceful blows, without any success in the removal of a flake.

These planes of least resistance sometimes tend to run parallel to the original cortex of the nodule, but they are greatly modified by irregularities in the toughness of different parts of the same stone. In the case of flint that has been broken up by thermal, or other strains, the direction of the planes of least resistance to fracture is

largely determined by the angles and curvatures of the external faces of the fragments; and also by the practicability of obtaining an adequate "grip" upon the surface for the reception of the blow.

If the angle of an edge be greater than a right angle, the force required to remove a flake of a given size is also greater (other things being equal) than when the angle is less than a right angle. There is also, under the former conditions, a tendency to produce a mere contusion of the surface rather than to remove a flake.

If the angle of an edge be a low angle of less than 45° , there is a tendency for the angle of the flake removed to be also low, and for the flaking to run far back over the face of the stone. It is this tendency which comes to be instinctively encouraged by man in the flaking of flint implements, other than flake implements or the bevelled edge of scrapers. It is the conscious adaptation of this principle to the production of some useful form of implement that is the distinguishing feature of human workmanship.

The original angle of the edge from which flakes are removed will be referred to as the *flaking angle* where human work is concerned, and the *chipping angle* where the work is of mechanical or doubtful origin.

In former papers I referred to all flint chipping as "flaking." For the sake of additional clearness, I propose to confine the use of the term "flaking" to the human technique. The process of removal of thin plates from the surface of flints by thermal fracture, may appropriately be defined as "scaling" rather than "flaking."

The flaking (or chipping) angles are illustrated in the diagram (Fig. 1), where the plane A B is the striking plane. The angle A B C is the outer flaking angle.

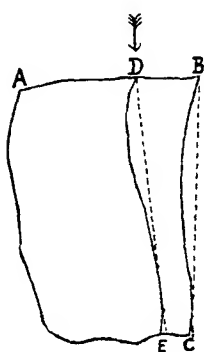


FIG. 1.—DIAGRAM
SHOWING THE
FLAKING ANGLES.

After the removal of a flake along the plane D E, by a blow delivered in the direction of the arrow at the point D, the angle A D E becomes the inner flaking angle, and B D E the re-entrant flaking angle. It will be understood that these flaking planes of conchoidal fracture are nearly always undulating, in consequence of which mathematical accuracy in the measurement of the angles is unattainable. I have taken the nearest straight line to the most important part of the curve, as shown by the dotted lines. In the case of greater irregularities of surface the specimen has to be eliminated as unsuitable for measurement.

In further definition, a flake struck in the manner indicated by the arrow may be described as "plane-struck," that is removed by a blow struck well on the striking plane. If the flake be removed by a blow delivered close to the point B, it may be described as "edge-struck."

The natural laws of the facility of chipping along the planes of least resistance, of the possibility of the control of the material in designed flaking, and of the limitations of that possibility, are those which are at the foundation of all flint chipping.

The diagram (Fig. 2) illustrates in cross-section the removal of three successive flakes, in the order in which they are numbered (1, 2, 3), firstly (A) along the planes of least resistance, which results in the blunting of an original sharper edge, and secondly (B) the most elementary form of the control of the material in the production of a sharp edge.

The planes of least resistance to fracture observed in the flaking of implements, are also found to hold in the case of experimental chipping by mechanical force.

An illustration of this is shown sectionally in the diagram (Fig. 3). The specimen from which this diagram was taken measured 81×62 mm. across the basal plane, and was 39 mm. in thickness. Blows of an energy of 1.1 watts¹ delivered upon the basal plane from the directions α , α' , α'' , produced free chipping on the edges. In the case of blows delivered from this general direction α , there is a wide range of angle at which they may fall without producing much modification in the results. From the direction β , blows of about the same force may remove chips nearly parallel with the basal plane, but there seems to be a narrower range of angle from which the blows may be delivered, and there is a practical difficulty in obtaining an effective application of force in this edgewise position. The flint to be operated upon will naturally rest upon either side, but not so steadily upon its edge.

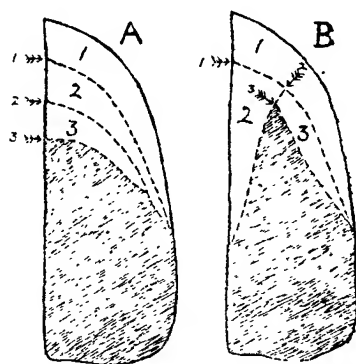


FIG. 2.—SECTIONAL DIAGRAM SHOWING (A) CHIPPING ALONG THE PLANES OF LEAST RESISTANCE, AND (B) ELEMENTARY CONTROL.

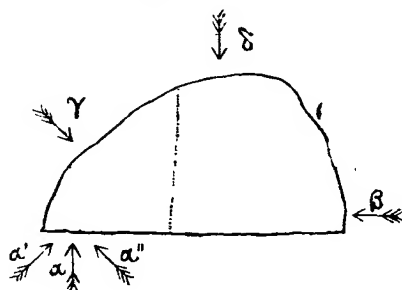


FIG. 3.—DIAGRAM OF RESISTANCE TO FORCE IN DIFFERENT DIRECTIONS IN A FLINT OF PLANO-CONVEX FORM.

In the direction γ , the force of the blows was raised to an energy of 4.65 watts before a chip was removed. In the δ direction, the impact of the blows was gradually raised to 29.4 watts, but the only result (an extremely important one however) was further edge-chipping in the α direction by the back-pressure of the stones on which it rested. The support used was damp gravel of fine grade. The impacts could not effectively be further increased without the use of a more resistant support.

It will be understood that it is not possible to give a ratio for α and δ chipping, which would be universally true; it depends entirely upon the form and condition of the flint used. But the experiment described above illustrates a general principle which is of wide application.

It is only in the event of the α chipping becoming cut far back into the body

¹ For an explanation of these technical points, see Part II.

of the stone, as suggested by the dotted line in Fig. 3, that chipping in the δ direction becomes obtainable with reasonable facility upon a flint of the form indicated.

I submit that this tendency of flint chipping is little less than a law of vital importance to the elucidation of the problems before us. Under certain well-defined conditions governed by the form and quality of the flint operated upon, we find: *That forces acting from a wide range of angle upon either side of a flint tend to produce chipping in one direction only, rather than in the various directions corresponding to the incidence of the blows.*

Such selective chipping in one direction, which is in reality the natural result of forces acting mechanically from all directions, not infrequently simulates the operation of intelligent design.

6. THERMAL FRACTURE.

This is generally taken to refer, not to the calcination caused by burning, but to a special form of fracture due to rapid changes of temperature, associated with frost, sun-heat, and the like. By such means strain is set up within the mass of a flint through unequal expansion or contraction. Starting from an internal point, the strain passes outwards on every side towards the periphery of the object in a series of rippings, until the nodule parts along the plane of separation thus produced.

This fracture, in its ideal development, may be recognized by the surface rippings, which are approximately concentric to some point on the interior of the fractured surface, but not always in its centre. This point is not infrequently associated with some fragment of fossil embedded in the stone, or of some other inequality in its texture (Plate XXIX, Fig. 8). This is one of the easiest forms of fracture to recognize, and is seldom mistaken for anything else even by the least experienced.

Thermal fracture also acts in a more superficial manner in the removal of shallow pits, known to the French as "pock-marks." These are extensively developed upon the surfaces of flints exposed to sun-heat on the Egyptian desert.

7. PRISMATIC FRACTURE.

This is a form of fracture in which the flint is split up into prismatic splinters. The surface rippings are poorly developed and peculiar: when present they often radiate both longitudinally and transversely. This fracture may, I think, usually be traced to the shattering of the flint nodules by tectonic movement in place in their original position in the chalk. I have frequently observed it in such situations. It may, however, be produced by any other violent shattering of the material; as illustrated, for instance, under Section 12 of this paper.

There is nothing in this fracture which should cause it to be mistaken for human work, although, as a matter of fact, during the past two or three years examples have been purchased as human implements (which did not claim to be pre-Palæolithic) by one of our large museums, and other illustrations have been figured in a recent scientific memoir of great importance.

8. OTHER FORMS OF SPLITTING.

One may place in this group the inosculating flaws associated with calcination, but this need not detain us here.

There is, however, one other point which should be noted, and this is fracture by indirect violence, or the breaking of flint by tension or flexion at some point other than that at which the force is applied. It is easily produced experimentally by striking the branch of a flint nodule, when it may part, not at the point of impact of the blow, but across the neck connecting the branch with the main part of the nodule.

The fractured surfaces have no cone of percussion, and frequently tend to be remarkably flat. I believe that these fractures take place beneath the surface, in flints embedded in drift, through subsoil movements.

These breakages cannot in themselves be confused with human flaking, but they have a direct bearing upon our inquiry, because they frequently present favourable angles from which further chips may be removed by other means.

In fractures caused by flexion there is frequently a hinge-like curve developed at the axis of the bend, as illustrated in the diagram (Fig. 4), where the end B is being violently bent away from the piece A. This form of hinge-fracture is familiar from its occurrence in prehistoric axe- and adze-blades of flint which were broken in manufacture or by violent usage, apparently of a kind which brought a lateral strain into play. It cannot be adapted to any useful purpose for the making of implements, but is a constant source of damage.

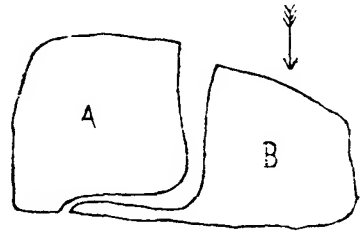


FIG. 4.—DIAGRAM SHOWING HINGE-FRACTURE BY A FORCE INDUCING FLEXION.

9. THE EFFECTS OF CONCUSSION.

Fractures by concussion, or the shock of one stone striking against another, may take place by various means where neither stone is held in the hand.

When a branched flint nodule is subjected to a series of concussions caused by other stones striking against it, the branches are first detached across the narrower necks which connect them together. We have now two, three, or more angular

flints in place of one whole nodule. This is illustrated in the generalized diagram (Fig. 5), where the original nodule is broken into four pieces A, B, C, and D.

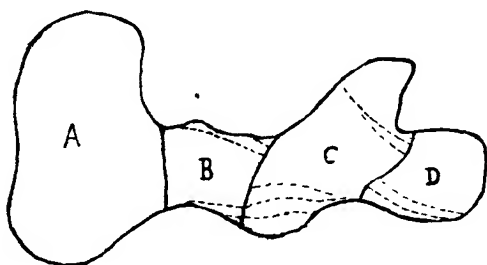


FIG. 5.—DIAGRAM SHOWING THE FIRST STAGES IN THE BREAKING-UP OF A BRANCHED FLINT NODULE, WITH THE PLANES OF LEAST RESISTANCE IN THE SEPARATED FRAGMENTS.

Examination of these four pieces will show that the angles made by the newly fractured surfaces with the cortex of the nodule, now give certain planes of least resistance to fracture. These are shown in the diagram by the dotted lines; the fragment A having none.

If such pieces as B, C, or D be subjected to further concussions of moderate violence, it will be found that a series of parallel chips may

be detached along the planes of least resistance upon the principle already explained.

In the operation of mechanical concussions, such large and complicated issues are involved that it is not possible to deal with them adequately within reasonable limits of space. I will describe some characteristic examples, and must leave the reader to fill in much for himself.

The specimen illustrated in Plate XXXVIII, Fig. 1, was placed in a slight hollow in the ground, and was subjected to the impact of pebbles weighing 0.178 kilogrammes ($6\frac{1}{4}$ ounces) falling under the acceleration of gravity from a height of 1.06 metres ($3\frac{1}{2}$ feet), giving a kinetic energy of 2.0 watts. This force gave free α chipping from the basal plane at the smaller end of the flint, but not at the thicker end, owing to the greater resistance that it offered.

In the three views given of this specimen (1a, 1b, 1c) the crosses indicate ineffectual impacts, and the dotted outline round 1b shows the chips removed.

It is instructive to note that some of the blows upon the basal plane fell near the point of the flint, but the point was not broken away owing to the strength of the ridge that was behind it. The original shape of the flint having a slight lateral curve, the specimen assumed the "rostro-carinate" form. As it chanced, the blows in the β direction glanced off without effect; if they had fallen in such a manner as to obtain an adequate "grip" upon the surface (which they might have done), β chipping nearly parallel to the basal plane would have occurred. Even in that event, the result would have presented marked contrast with the most elementary form of control illustrated in Fig. 2, B. To obtain γ or δ chipping would have required a greatly increased kinetic energy.

In general comment upon these examples, and also upon that previously described under the heading of "The Planes of Least Resistance," I would wish it to be clearly understood that these are not fortuitous results, but deliberate and carefully planned experiments conducted for the purpose of investigating the chipping properties of flints of definite natural form.

In order to check these conclusions with regard to selective α and β chipping I have bowled the flint to be operated upon along a shingle beach. In this method the incidence of the impacts is fortuitous.

The results depend partly—as in all cases—upon the form of the raw material, and partly upon the strength of the force brought into play. If the force be sufficient to effect δ chipping, the influence of the selective α chipping is largely lost. But if the force is more moderate, selective α and β chipping may be obtained.¹

The specimen illustrated in Plate XXXIX, Figs. 1*a*, 1*c*, was treated in this manner, and it shows three parallel α chips along one side, the opposite side not presenting such a favourable angle for chipping.

One of these three chips is twinned. The diagram (Fig. 6) illustrates a twin facet springing from one point of impact. The surface ripples take a double curve upon either side of a dividing line between them, and the one chip separates into two. This form of twinning may be observed in human flaking; I am not well assured of its value, but I am under the impression that it is more commonly seen in non-human chipping than in human flaking. It is frequently to be observed in the effects of crushing.

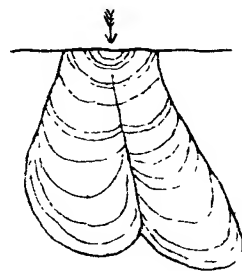


FIG. 6.—DIAGRAM OF A TWIN FACET.

The flint shown in Plate XXXIX, Figs. 2*a*, 2*b*, was treated in the same manner as the last, but the process was carried further. Again we find chipping along the planes of least resistance, and ineffectual contusions and incipient cones of percussion where the blows impinged against the flint in the more refractory directions. This example shows α chipping in the upper view (2*a*) and β chipping across the basal plane (2*b*).

These last experiments come into the group which I propose to call “Reverse Concussion,” in contradistinction to “Direct Concussion.” That is to say, the flint operated upon is itself the moving body striking against a stationary “anvil-stone” placed on the ground.

In dealing with material of plano-convex form, it is found that the conditions governing α , β , γ and δ chipping, respectively, follow the same general laws that have been already explained, except that perhaps β chipping is more easily obtainable, owing to the fact that the difficulty of placing the raw material steadily upon the ground in an edgewise position is not experienced.

A fortuitous incidence of blows may also be obtained by “reverse concussion,” if the flint to be operated upon is held in the hand, in a different position each time, and thrown up into the air with a very slight rotary motion, so that the manner in which it strikes the “anvil-stones” is absolutely fortuitous.

¹ Selective α chipping is also observed in the wash-mill effects, see M. Boule, *L'Anthropologie*, T. xvi, 1905, p. 257.

The example illustrated in Plate XXXVIII, Figs. 2*a*, 2*c*, was made by this process from a sub-cylindrical nodule, and it resulted in an astonishing simulation of a hand-axe, with an admirable hand-grasp and an excellent cutting-edge. From the purely utilitarian point of view, and neglecting the beauty of fine finish, it would be difficult to improve upon this as a primitive stone implement. The technical characters of the chipping were, however, purely eolithic (but *not* Kentish eolithic), and not palæolithic. The maximum kinetic energy brought into play was about 24 watts, but this method does not admit of an accurate calculation, as the height of fall can only be approximately measured.

The next example, Plate XXXVIII, Figs. 3*a*, 3*b*, 3*c*, was made from a flattish nodule, but not true "tabular" flint. It resulted in a form simulating a double-ended battle-axe, with two excellent cutting-edges, and a slight constriction round the middle for binding to the handle! The maximum kinetic energy brought into play was 8.5 or 9.0 watts.

The chipping upon these two specimens is very suggestive of control. It is not confined to the α and β planes of least resistance. The original form of the raw material did not lend itself to this selective chipping; and the force brought into play was sufficient to strike through in the oblique, or γ direction. Practically the only guide to show that these are not implements made by hand-flaking is found in the technical characters of the chipping—characters which are extremely important, but by no means uniform or easy of recognition.

The case for the determination of hand-flaking from the effects of concussions is not, however, so difficult as might appear from the foregoing. Such results as the two that we are considering are very exceptional, and if the total results were before us instead of two picked specimens, there would be evidence apparent to the trained observer that these were an associated group due to the same cause, and that this cause was a purely mechanical force.

It is true that palæolithic implements are selected, as an associated group by themselves, from the river gravels in which they are found, and it may be argued that there is equal justification for selecting the eoliths. This leads us to the difficult question of deciding the difference between that which may safely be determined as different in kind, and that which is different only in degree, from the (admittedly) naturally broken stones among which it is found.

On general lines I would submit that the exceptional results obtained by the fortuitous concurrence of mechanical causes, should lead us to expect something of an analogous kind from the fortuitous concurrence of natural causes. Beyond that, in questions of selective separation, or associative grouping, we are thrown upon the personal judgment of the trained observer, based upon an examination of the specimens themselves, just as we are in the determination of a shell or a bone.

The effects of "reverse chipping" are found in human workmanship. If, in using a hammer-stone of flint, a splinter flies backward off the hammer-stone instead of, or in addition to, that which it is intended to remove from the object struck, it

will be found that the characters of the chip resemble those obtained in mechanical "reverse chipping."

In addition to this semi-accidental illustration, a true "reverse flaking" is occasionally found as a deliberate technique of workmanship. That is to say, the implement in process of fabrication is struck against an anvil-stone instead of being struck by a hammer-stone. This technique tends to exhibit similar characters to mechanical reverse chipping, although they are not so pronounced.

There is one special technique of human flaking which presents certain peculiarities. In this method the facets are longitudinally convex, and the chips removed (viewed from the inner face) are longitudinally concave.

The purpose of this technique, which may be named "incurved flaking," is to reduce the thickness of the centre of the stone blade. This is illustrated in the sectional diagram (Fig. 7), where four flakes have been successively removed in the order in which they are numbered.

As a name for a definite style of work, found on certain palæolithic and neolithic working sites, the term "incurved flaking" should not be understood in a too restricted sense. It is a clearly defined group, representing a definite technique, which seems to be associated with the finishing of the larger implements; the incurved character being the dominant tendency, but it is by no means universally present. This technique shows a high skill, and I have not been able to reproduce it. The flakes are usually "edge-struck," and not "plane-struck." On the whole I am inclined to think it is due to reverse flaking. It may be due to pressure-flaking, but the surface rippings are sometimes exceptionally strong, and the bulbs of percussion are discordant with the effects of pressure so far as these are known to me, and agree fairly well with the effects of reverse flaking.

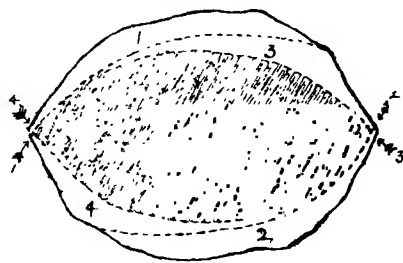


FIG. 7.—SECTIONAL DIAGRAM SHOWING "INCURVED FLAKING."

The comparison of the technical characters of flaking and chipping by different methods is dealt with in Part II, and illustrated in Plate XXXIX, Figs. 4 to 7.

10. THE EFFECTS OF CRUSHING AND OF DIFFERENTIAL MOVEMENT UNDER PRESSURE.

If a flint of tabular or plano-convex form be placed with its edge resting on another stone, as shown in the diagram (Fig. 8), and pressure be brought to bear upon it in the direction of the arrow, a series of chips may be removed from its edge as shown by the dotted lines.

It may be observed in the operation of this edge-chipping by pressure, that the chips removed in an early stage of the process usually strike as far back as they ever go, as seen in the chip *a x* in the diagram (Fig. 9). A prolonged

continuance of the action only results in the blunting of the edge, to $c x$. If, however, the pressure under which the work is being done be increased, a fresh set of chips, $d y$ to $f y$, will fly off.

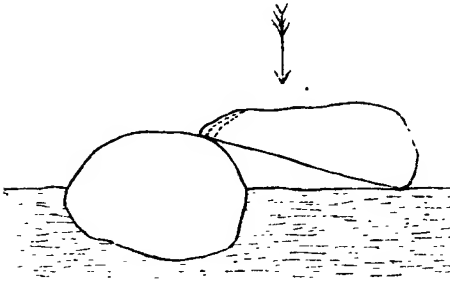


FIG. 8.—DIAGRAM ILLUSTRATING THE PRODUCTION OF EDGE-CHIPPING IN A FLINT BY PRESSURE AGAINST ANOTHER STONE.

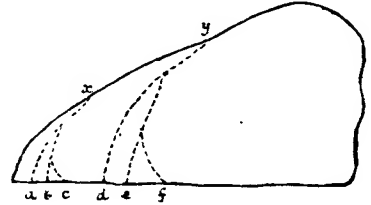


FIG. 9.—DIAGRAM ILLUSTRATING THE "DEPTH OF CHIPPING" UNDER A LESSER AND A GREATER PRESSURE.

In measuring the work done upon a flint under any given pressure, I have taken the perpendicular measurement from x or y to the basal plane, irrespective of the length of such lines as $a x$ or $b x$. I propose to speak of this perpendicular as the *depth of chipping*.

The methods employed for obtaining the necessary pressure have been:—
 (1) By pressing or stamping with the heel of one's boot. (2) By the sudden shock of falling iron weights. (3) By the similar shock of pieces of timber falling under the action of gravity. (4) As 3, but pressed down by muscular effort. (5) By pressure slowly applied in a screw press. (6) By the crushing action of cart wheels. (7) By the drag of a sled loaded under various weights; this gives a reversal of the relative positions of the rounded stone and the edge of the flint to be chipped.

The above processes represent considerable variety in the method of application of pressure, or crushing force, and it is important to note that they all give indistinguishable results.

It is remarkable that a single application of pressure, even if lasting only for a fraction of a second, results in many cases in the removal of a surprising number of small chips, each one leaving a facet behind it. This is especially the case where there is a slip between the two surfaces when the pressure is applied and where the underlying stone has a rough surface, as this greatly facilitates the chipping.

Under the conditions indicated, there is usually a certain amount of slip or movement between the two surfaces which are in contact when the pressure is applied. Dead crushing without movement may, however, produce edge-chipping, provided the force be applied at the right point on or near the edge. This often happens in the case of cart-wheel crushing. But this method in the application of pressure is not generally so favourable for the production of edge-chipping as that of differential movement under pressure. For in the latter case the force tends to

become automatically applied in the right manner and place (that is, on the edge of the flint), as the two stones forcibly grind across each other.

If forces of dead crushing without movement act centrally upon a flint from two, three, or more directions, and if the resultant force be sufficient to break or crush it, cones may develop at each pressure-point. These cones are usually strong, and the fractures springing from them not infrequently intersect each other and split the flint up in a very complicated manner, many of the fragments assuming the well-known prismatic form (see Fig. 10). If there are only two pressure-points, the flint will often split in half, with two cones (one above and one below) corresponding to the two pressure-points.

The forms produced by the seven methods referred to above are dependent partly upon the original shape of the raw material, and partly upon the form of the underlying surface against which it is crushed. When this underlying surface is convex, the resultant edge-chipping is concave. When the underlying surface is flat, and the original shape of the raw material permits of it, the chipped edge may be straight; where the former is concave, the chipped edge may be convex.

Where the underlying surface is irregular, or where it is formed of two pebbles close together, particularly interesting forms are produced. In the latter case especially there will be two chipped concavities with an intervening point between them.

Again, if a concavity be crushed out of the edge of a tabular piece of flint, and then it be turned over and another concavity be crushed out from the opposite side a little distance from the first, a curiously drill-like point with reversed chipping will result.

Characteristic examples of these various forms produced by crushing are illustrated in Plates XXXIX and XL.

The results which I had obtained between the years 1900 and 1905 by several of the above-mentioned methods have already been described in *Man*, 1905 (103) and 1906 (3), and in the *Journal of the Anthropological Institute*, vol. xxxv, 1905, pp. 337-364, Plate XXVI. The last method referred to, namely that of the sled, requires some further explanation. The flints to be experimented upon were placed in pigeon-holes in a wooden frame, and then pebbles fixed in the bottom of a sled were drawn over their projecting edges. A box was nailed upon the upper part of the sled in which weights could be placed, while the sled itself weighed originally 20 kilogrammes (44 pounds), but after some reconstruction it weighed 17.75 kilogrammes. The arrangement will be made clear from Fig. 11, where the arrows represent the vertical and horizontal forces brought into play: the latter being supplied by the pulling of one man with a block-and-fal giving a mechanical

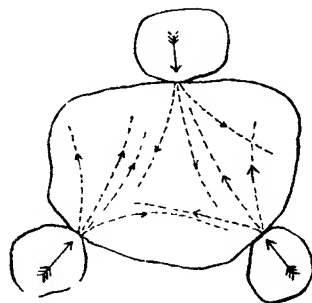


FIG. 10.—DIAGRAM SHOWING THE OPERATION OF PRESSURE ACTING CENTRALLY UPON A FLINT FROM POINTS OF CONTACT WITH SURROUNDING STONES.

advantage of from 2 to 5 according to the number of "sheaves" brought into use.

In comparison with the theory of chipping by soil-abrasion (the active process of solifluction) under pressure, it is particularly useful that the sled experiments separate the vertical pressure from the horizontal traction. It is important to consider the relations between α , β , and γ , chipping in this class of experiments. Hitherto we have been dealing with α chipping only, as illustrated in Figs. 8 and 9. But if the plano-convex flint be placed in the reverse position, with its convex side against the other stone, the two surfaces tend to slip away from each other when pressure is applied. This is illustrated in Fig. 12, where the upper arrow indicates

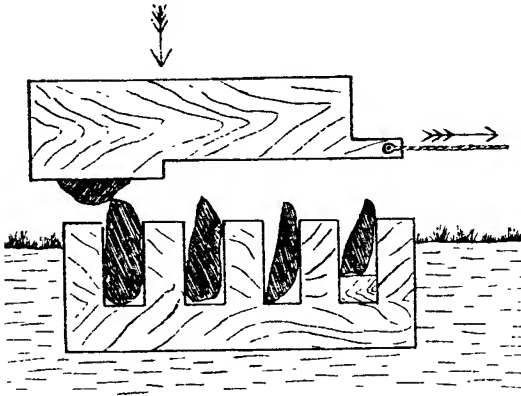


FIG. 11.—DIAGRAM SHOWING (IN SIDE VIEW) THE ARRANGEMENT OF THE SLED EXPERIMENTS.

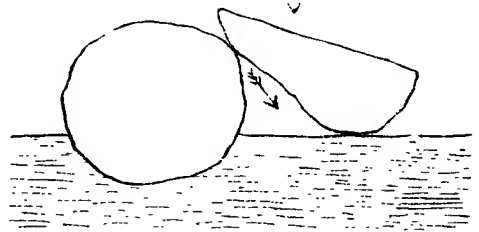


FIG. 12.—DIAGRAM ILLUSTRATING THE POSITION OF "SLIDE" WITHOUT CHIPPING.

the application of the force, and the lower arrow the direction of the slip. That is to say, there is no effective "grip" between the two surfaces.

I first suggested this principle in the papers published in 1905, but to Mr. F. N. Haward belongs the credit of having given it the graphic name of "chip-and-slide."¹

It will also be understood that it is not generally easy, except sometimes in the case of a very thick flint, to obtain true β chipping with a plano-convex flint under pressure, because the equilibrium between the two stones in the edge-to-edge position is unstable, and they tend to slip past each other. With regard to δ chipping, the flints under operation not infrequently snap across by "hinge-fracture," but true δ chipping would require enormously greater pressure than α chipping.

Thus the general principles governing the production of α , β , γ , and δ chipping are of equal importance under the operation of pressure, to that which we found them to be with concussions.

¹ "The Chipping of Flint by Natural Agencies," *Proc. Prehist. Soc. East Anglia*, vol. i, 1912, p. 185. Also "The Problem of the Eoliths," *ibid.*, p. 347.

Before closing this branch of the subject, there are two other points of some interest, namely, the special conditions presented by a plano-convex flint with an original notch in its edge; and that of the tabular flint. In the former case we might be led to imagine that the original hollow would be the protected part. In the operation of concussions this doubtless is the case, as a general rule, but under the operation of movement under pressure, the "attacking" pebble slides into such an original notch, obtains an increased "grip" in that situation, and as a consequence does more execution. This is illustrated in Fig. 13, with the resultant edge-chipping suggested by dotted lines.

In the case of tabular flint, true δ chipping does not exist, but α chipping may occur with equal facility in either direction. This comes into instructive comparison with the Kentish eoliths.

In general summary of movement under pressure upon plano-convex or tabular flint, it is particularly noteworthy that the effects obtained are in conformity with a series of well-defined "types." Of this group of "types" the notch, or pseudo-hollow-scraper, is the central point, and dominant over everything else. In the one direction, the notch becomes shallower, and passes through the straight edge to the outward curve, or pseudo-scraper, or to mere indefinite edge-chipping. On the other side the notch is found either double, or double-reversed (the pseudo-drill), or it occurs in combination with other edge-chipping.

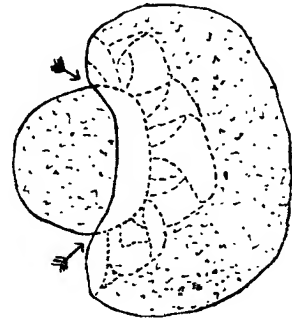


FIG. 13.—DIAGRAM SHOWING IN PLAN THE INCREASED GRIP OBTAINED IN AN ORIGINAL HOLLOW IN THE EDGE OF A FLINT, WITH THE RESULTANT EDGE-CHIPPING SUGGESTED BY DOTTED LINES.

In the effects of concussions we have already noted the influence of selective α chipping; but the results of concussions, as a whole, are less systematic, and generally inferior to those obtained by pressure. If forces of greater violence be brought into play, the effects break away from what one may describe as the systematic restraint automatically imposed by the influence of α chipping, and very astonishing results may occasionally be produced. But at the same time, that which is gained in exceptional cases by a deceptive appearance of control of the angles is lost by its sporadic uncertainty, and by the absence of system in the group.

In carrying on experiments under pressure, year by year, one finds that the same group of forms repeat themselves indefinitely in the results obtained, and that these results are indistinguishable from the eolithic forms.

11. APPLICATION OF THE STUDY OF FLINT FRACTURE TO THE PROBLEM OF THE EOLITHS.

(a) *The Eoliths of Kentish type.*

In applying the results obtained by the study of flint fracture to the problem

of the human or natural origin of the eoliths, one must undoubtedly proceed with caution.

In considering the problem of chipped flints of doubtful origin one has to take into account:—

- (1) Whether the chipping shows conscious control of the material, or whether it follows the planes of least resistance only (particularly the α and β chipping).
- (2) Whether the forms of the chipped flints are conceivably useful as implements.
- (3) Whether the characters of the chipping (disregarding size) agree with those observed in that produced experimentally by (*a*) human flaking, (*b*) mechanical concussions, (*c*) dead crushing, (*d*) differential movement under pressure.
- (4) Whether there is associated evidence of (*a*) contused surfaces indicating concussions by water abrasion, (*b*) striated surfaces pointing to movement under pressure by ice or soil-abrasion.

With regard to the first point, it is not possible to hold two opinions upon the fact that the chipping upon the Kentish eoliths follows the planes of least resistance only, and does not show control. At the same time this does not prove that they are not human implements, because if man existed at this early time he might not yet have acquired the skill necessary to enable him to control the angles of chipping.

Upon the second point, the Kentish eoliths as a group are not, to my mind, very convincing as implements, although some of them might be useful. This, however, does not prove that they are implements, because many natural stones are capable of serving as excellent implements. In fact, I think one might say that so long as man remained unable to control the flaking angles, to some degree at least, naturally broken stones would make as good implements as anything that he could chip for himself.

With regard to the third point, there can be equally no question that the characters of the Kentish eoliths agree with the results of mechanical movement under pressure. The same forms can be imitated by hand-chipping if a method of lifeless knock—knock—knock of one stone against another be adopted. But it requires—if the apparent contradiction can be understood—a carefully controlled absence of control in the manipulation. If this process of lifeless and mechanical knocking be carefully maintained, I am not sure that the results can be distinguished from the effect of mechanical movement under pressure. But the numerous and special characters common to the eoliths and to these particular mechanical effects, cannot be reproduced by that free delivery of sharp blows which it appears to me would be the technique most simply and naturally adopted by primitive man.

In discussing the Kentish eoliths I take the Prestwich collection now in the British Museum of Natural History to be the type series, and I have to thank Dr. A. Smith Woodward, F.R.S., for the facilities that he has given me for its examination. My remarks have no application to anything that is not in accordance with this series.

The fourth point must now be considered, namely, whether it is reasonable to suppose that the necessary forces to produce edge-chipping have actually been in operation in superficial drift deposits.¹ It is sufficiently obvious that the weight of a bed of sand or clay remains a static force which is powerless to injure the most fragile shell (when this is filled with the same material), so long as no movement takes place.

It is my opinion, and I think that most field workers will agree with me, that in the case of drifts at high elevations clinging to the sides of hills, movement has been widely in operation. Nor is this action confined to hilly districts, or to districts with soluble calcareous sub-soils. Mr. W. Shone dealt with the subterranean erosion of non-calcareous deposits, and the consequent foundering of the superincumbent beds, in a paper brought before the Geological Society in 1892.² I have also given additional illustrations in the paper previously referred to.³

But I think we can go further than these generalities, and find direct evidence to support their application to the case in point. The present writer has previously drawn attention to the evidences of differential soil movements, furnished by the striated surfaces which are so commonly associated with the eoliths in the field.

It appears to me that this evidence is conclusive, for I do not know by what means, except by movement under pressure, the scratching of the surfaces of stones can be effected.

It is noteworthy that the scores passing across the surface of the flints are sometimes directly associated with the notches which I believe to have been squeezed out of their edges by the same force.

(b) *The Sub-Crag flints.*

In considering the effects of crushing on a larger scale and under greater pressure, one is confronted with serious practical difficulties.

It is not possible to work experimentally under pressures which are comparable with those that obtain beneath an ice-sheet, or even beneath a considerable thickness of sand or clay, without the aid of power, and the erection of expensive plant. I greatly question if such expenditure would be justifiable, even if a sufficient grant could be obtained from some public body having financial resources at its disposal for purposes of scientific research.

¹ The quantitative consideration of this problem is discussed in Part II.

² W. Shone, *Quart. Journ. Geol. Soc.*, vol. xlviii, 1892, pp. 96-103.

³ S. H. Warren, *Journ. Anthropol. Inst.*, vol. xxvi, 1905, pp. 349-357.

For my own part I am content to consider the reasonable probabilities of the case in arguing from the known smaller to the unknown greater.

Many of the general points referred to under the heading of the Kentish eoliths apply equally well to the case of the sub-crag flints. In fact many eoliths of Kentish type occur in the basement bed of the crag, although these are not the most notable or conspicuous of the series, at least not so far as size is concerned. So far as this smaller edge-chipping of the sub-crag flints, and that of the Kentish eoliths, is respectively concerned, I see no possibility of escape from the general proposition that whatsoever is the origin of the one is also the origin of the other.

In the "rostro-carinates" we are presented with an extreme development of the eolithic form which is but rarely seen under other circumstances, except in a comparatively diminutive size. But where greater forces are operating upon bigger material I do not think that the consideration of size is important. The close association of this type with the familiar notches-with-point, which are so characteristic of the effects of pressure, is illustrated in Figs. 4 to 10 of Plate XL, and I will leave these illustrations to speak for themselves.

Upon the relative merits of the sub-crag, and of the Kentish eoliths, opinion is strangely divided. My friend, Mr. A. Santer Kennard, F.G.S., while still continuing to maintain his belief in the Kentish eoliths, strongly repudiates the claims of the sub-crag flints. Upon the whole, however, I am inclined to think that opinion is more favourably disposed towards the sub-crag flints than it is towards the Kentish eoliths.

For my own part, as I go backwards and forwards from the Prestwich collection of eoliths at South Kensington, to the collection of sub-crag flints deposited by Sir Ray Lankester at Bloomsbury, I can only say that whichever series I examine the last always appears to me, from the point of view of being human implements, as the more incredible!

But to return to the suggested points of inquiry set forth at the beginning of the discussion upon the Kentish eoliths. Of these, the question of control is one of supreme importance.

The "rostro-carinates" are admirable examples of chipping along the α and β planes of least resistance,¹ while the technical character of the chipping is also in agreement with that observed in the operation of mechanical pressure.

A certain number of the sub-crag flints, however, are more suggestive of control, although they do not belong to systematic types. It may be that these are the sporadic products of violent concussion rather than the effects of pressure. But it is not upon these aberrant forms that the greatest stress is laid. The more

¹ Sir E. Ray Lankester, "Description of the Test Specimen of the Rostro-Carinate Industry found beneath the Norwich Crag," *Roy. Anthropol. Inst.*, Occasional Paper, No. 4, 1914. That the rostro-carinate form is produced by chipping along the planes of least resistance is confirmed by the evidences of its evolution upon a modern sea beach, described by Professor Sollas before the British Association in 1913.

systematic types make a stronger appeal, although as a matter of fact they are more easily explained upon a mechanical basis. The aberrant types are the product of such absolutely fortuitous causes that they defy detailed explanation. The systematic α and β chipping is on the other hand the inevitable result of the operation of certain definite forces acting upon raw material of certain definite forms.

On the more personal side I may explain that for some years past I have been searching for Palæolithic implements in the gravels of the Tendring Hundred of Essex. In addition to the implements, I found many chipped flints, which, as I saw them on the ground, I took to be also human implements, but upon closer examination I came to the conclusion that they were non-human. One of these in particular was extraordinarily like a Mousterian point, but it was yet in my opinion definitely non-human in origin.

I had been noting these remarkable chipped flints for some years, before the sub-crag flints were known to me; now that I have come to recognize the mineral condition and the chipping of the sub-crag flints of Ipswich, it is quite clear that those from the Essex gravels are sub-crag derivatives. I mention this to show that my judgment of the sub-crag flints, whether right or wrong, is not a matter of prejudice based upon their date, but is one which I formed upon the intrinsic merits of the flints themselves without knowing them to be earlier than the Palæolithic Age.

With regard to the associated field evidences of the sub-crag flints, the proofs of the operation of mechanical forces in the shape of contusion, powerful striation, and the like, are generally recognized. I hold the unequivocal opinion that whatever force produced the scratching would be equally capable of effecting the chipping.

12. THE HAREFIELD SECTION WITH FLINT CHIPPING BY SUB-SOIL PRESSURE.

Upon the occasion of the visit of the Geologists' Association to the works of the British Portland Cement Company on April 26th, 1913, I found some instructive evidences of the sub-soil chipping of flint by the pressure of the super-incumbent strata. The pit is situated near the village of Harefield, and shows the Reading Beds and base of the London Clay overlying the chalk. The actual thickness of the Tertiary Beds varies with the configuration of the overlying surface, but it must have reached, or exceeded, one hundred feet within comparatively recent geological times. It is the operation of the pressure due to this great thickness that is recognized in the results.

At one part there is a variable and irregular bed of flint gravel, up to six feet or rather more in thickness, at the base of the Tertiaries.

The top of the chalk is riddled with tubular borings which have given rise to some discussion, but by whatever organisms they were made, there can be little doubt that the borings were effected when the chalk surface formed the floor of

the Eocene sea. There is also no residual green-coated band seen in this section. It is then clear that the maximum amount of chalk which has been removed in solution since early Tertiary times is limited to a very few inches. This has an important bearing on our subject.

A considerable proportion of the flints composing the basement gravel of the Tertiaries are broken by the pressure which they have exerted upon each other, some being almost reduced to powder. It is very instructive to dig these stones out and observe the shattered cones which have been developed at points of contact between them, as indicated in the diagram (Fig. 10). There can, I think, be no question that vibration, or other stress, has been set up within the mass of this gravel, to convert the static force of pressure in equilibrium into a dynamic force capable of doing work. This stress has probably been caused either by earthquakes, by changes in volume due to variation of temperature or moisture, or to the very slight amount of solution of the chalk surface which has probably taken place. But there has been no perceptible movement or displacement. Many of the broken flints are still so closely held together that one cannot see that they are broken until one touches them.

Among the broken flints, many good bulbous chips, still remaining in the facet upon the parent block, may be found. In some cases notches have been squeezed out of the edges of the flints, and occasionally the edges are chipped in a manner which is very suggestive of human work, as illustrated in Plate XL, Figs. 11, 12, 13.

The chipping presents certain special features and differs from that of the Kentish eoliths, and also from that of the sub-crag flints. The special character of the chipping is due to three main causes: (1) the character of the raw material, (2) the strength of the force, (3) the comparative absence of movement. On these points one may observe that the raw material consists largely of Tertiary pebbles, and even when this is not so it is often of poor flaking quality. On the second point, the strength of the force has been so great that the ultimate depth of chipping is never reached, but free chipping at various angles, according to the incidence of the pressure, continues throughout.¹ While thirdly, the special characteristics produced by movement under pressure are for the most part wanting, as so little movement has taken place.

Thus the notches are usually squeezed out in one or two larger chips only, instead of in many small chips, as we find in movement under a comparatively small load of pressure.

Still, a search of a few hours in the section will generally reveal examples of chipping which has a close resemblance to supposed human work. If the comparative absence of movement brings its limitations, it has the unique advantage of leaving the chips in contact with the parent blocks. If more movement had

¹ Measurement of 34 chipping angles gave a range of from 43° to 92°, with only a slight concentration between 60° and 70°.

occurred there would have been a larger amount of good chipping, but the chips would have become separated, and the extreme enthusiast, in spite of the palæontological improbability of the existence of man in the Lower Eocene period, might still have claimed them as human implements.

In following this class of evidence, the fact that movement gives the best chipping but separates the chips, imposes certain limitations from which I am afraid there is no escape.

I would, however, particularly draw attention to the important evidences regarding a "Nature's workshop" site described by Mr. F. N. Haward.¹

13. GENERAL OBJECTIONS AGAINST THE EOLITHS.

One of the general difficulties against the acceptance of the eoliths as human implements, which weighs with me almost more than any other, is their extraordinary evolutionary history.

It may be stated as a general rule that the group of eoliths found in any deposit is independent of the age of that deposit.

It is true that in some cases earlier deposits contain more primitive eoliths than later deposits, but this is not uniformly the case. Quite as often the reverse is found to hold, and eoliths of advanced form are found in earlier deposits of the Tertiary period and eoliths of primitive form in later deposits.

My friend Mr. Arthur Wrigley made a considerable collection of eoliths from the Low Level gravels of the Lea Valley, which are later than the Mousterian epoch (and I have also found many myself) which are of very primitive form, and compare in a remarkable manner with those from the *Elephas meridionalis* bed of Dewlish; while many of the eoliths from Miocene, Oligocene and Eocene strata are of far more advanced forms.

The evidence seems to point to the conclusion that either primitive or advanced eoliths may occur equally in deposits of all ages where suitable material exists for their production, and where this material has been subjected to the right forces.

This is a most extraordinary state of things, in view of the theory of their human origin, but that which we should expect if, as I believe, they are due to natural causes.

Another difficulty is found in the fact that prehistoric implements have sometimes been converted into eoliths subsequently to their patination.

Mr. W. Cunningham was the first to point out that there are eoliths from the Kent plateau,² differing in no way either in chipping or in patination from those supposed to be pre-Palæolithic, which are yet made out of old abraded and broken

¹ F. N. Haward, "The Chipping of Flints by Natural Agencies," *Proc. Prehist. Soc. East Anglia*, vol. i, 1912, p. 185. See also the important evidences to a similar effect described by the Abbé H. Breuil, *L'Anthropologie*, T. xxi, 1910, p. 385.

² W. Cunningham, *Quart. Journ. Geol. Soc.*, vol. liv, 1898, p. 291.

palæoliths. Similar facts have also been insisted upon by the present writer,¹ and more recently by Mr. F. N. Haward.²

With respect to coliths recently made upon sea beaches and the like, it has been urged against them that they are only temporary forms in the making of the pebble. Surely nothing could be a weaker defence. The pebble is itself but a temporary thing, and gradually gets smaller and smaller, and finally disappears. The question as to whether the edge-chipping upon a flint has been done by Nature or by man does not affect its subsequent fate—whether it may be destroyed by continued abrasion, or whether it may become preserved in a geological deposit. The torrent does not select the chipping of Nature for destruction and preserve the work of man.

The danger of the arguments from similarity of form and from the presence of a hand-grip opposite to the chipped edge has been shown again and again, by Mr. F. N. Haward, Mr. W. H. Sutcliffe, in a previous paper by the present writer, and also by others.³ It is so easy to argue in a circle to show that our series of flints indicates intelligence, and not to see that the intelligence has been put into them by ourselves, in our own selection out of the infinite variety of Nature. While with regard to the hand-grip, one must not forget that the adaptability of the human hand is very considerable, and it is inevitable that the thinner and weaker edge of a flint will become accidentally chipped where the thicker and stronger edge opposite to it (forming the alleged hand-grip) will remain comparatively unchipped.

PART II.

14. TECHNICAL DETAILS AND TABULATION OF EXPERIMENTAL RESULTS.

The kilogrammetre.—This is the amount of work done in raising one kilogramme to a height of one metre against gravity: two kilogrammetres being equally the work of raising two kilogrammes one metre, or of raising one kilogramme two metres. The equivalent English measure is the foot-pound (not the foot-poundal); it is similarly estimated: one foot-pound being equal to 0.1383 kilogrammetres.

Momentum.—The power of doing work possessed by a moving body depends upon its momentum, which is the product of the mass into the velocity: the same mass having four times the power of doing work when travelling at twice the velocity.

¹ S. H. Warren, *Journ. Anthropol. Inst.*, vol. xxxv, 1905, p. 344, and plate xxvi, figs. 2 and 3.

² F. N. Haward, *Proc. Prehist. Soc. East Anglia*, vol. i, 1913, p. 347.

³ F. N. Haward, *Proc. Prehist. Soc. East Anglia*, vol. i, 1913, p. 353, etc. W. H. Sutcliffe, *Mem. and Proc. Manchester Lit. and Phil. Soc.*, vol. lvii, 1913, No. 7. For further criticisms on general points, and references to the literature of the subject, vide S. H. Warren, *Man*, 1913 (20), and *Geological Magazine*, 1914, p. 546.

Kinetic energy.—The true *vis viva*, or kinetic energy, is calculated by the formula

$$\frac{1}{2} M V^2$$

where *M* is the mass and *V* the velocity. This calculation of kinetic energy may be based upon any units of measure that may be chosen, that adopted here being one kilogramme (or one pound), as the unit of mass, and one metre (or one foot) per second as the unit of velocity. Strictly speaking, these units of mass are only accurate so long as the force of gravity remains constant, which for our present purpose we may assume. This basis of calculation gives the kinetic energy in watts (or foot-pounds); 1 watt being equal to 23·72 foot-pounds.

Falling bodies.—The experiments upon the chipping produced by the impact of one stone against another, have been conducted by releasing stones from a measured height and leaving them to fall under the acceleration of gravity. This is a very convenient method, as it enables the necessary calculations to be made. As we cannot measure the time, and do not need to do so, the formulæ most usually given may be modified, so that the velocity (*V*) can be calculated directly from the height of fall, or space traversed (*s*), and the acceleration (*g* = 9·81 metres or 32·19 feet in London); thus:—

$$V = \left(\sqrt{\frac{s}{\frac{1}{2}g}} \right) g$$

The following table will give a general idea of the relations of the factors with which we are dealing, and the range covered in the tabulated effects of concussions.

TABLE I.—FALLING BODIES.¹

Weight of body.		Height of fall.		Velocity per second.		Kinetic energy.	
Kilogrammes.	Pounds.	Metres.	Feet.	Metres.	Feet.	Watts.	Foot-pounds.
0·0068	0·015	1·83	6·0	6·00	19·65	0·122	2·9
0·0454	0·1	0·76	2·5	3·86	12·7	0·34	8·06
0·272	0·6	2·44	8·0	6·9	22·7	6·5	154·5
0·326	0·7187	0·61	2·0	3·46	11·35	1·95	46·3
0·557	1·229	1·37	4·5	5·19	17·0	7·5	178·0
1·44	3·187	1·68	5·5	5·73	18·75	23·6	560·0
5·17	11·4	0·102	0·33	1·41	4·63	5·14	122·5

¹ In this table, and also in those which follow, the equivalent values in the English and the metric systems are given side by side.

The pressure of impact.—The pressure of a blow is theoretically estimated by the relation between the kilogrammetres (or the foot-pounds) possessed by the striking body, and the distance through which it is brought to rest. A moving body striking with a force of 10 kilogrammetres and brought to rest within a distance of $\frac{1}{100}$ metre, is said to exert a pressure of $10 \times 100 = 1,000$ kilogrammes. If it had been brought to rest in $\frac{1}{1000}$ metre, it would have exerted a pressure of $10 \times 1,000 = 10,000$ kilogrammes, and so on in similar proportions.

Thus in experiments in flint chipping we must bear in mind the fact that the effective pressure of the blow will depend upon the resilience (or modulus of elasticity) of the support on which the flint is placed to be operated upon. In experiments upon "direct concussions," I have used a considerable variety of support, hard dry clay, resilient turf, soft wet gravel, and the like, while sometimes the flint to be operated upon has been held in the jaws of a screw press. I have been so far unable to eliminate the influence of the support. When working under otherwise similar conditions (kinetic energy, velocity, quality of material) the results obtained certainly come within the same general limits of variation, both as regards size and characteristics; the only exception being that when working under low velocities of less than three metres per second it is very difficult to obtain a chip of any kind upon a loosely placed flint. Under these low velocities it is practically necessary for the flint to be firmly placed, or it is only pushed on one side. This limitation does not apply to "reverse concussions."

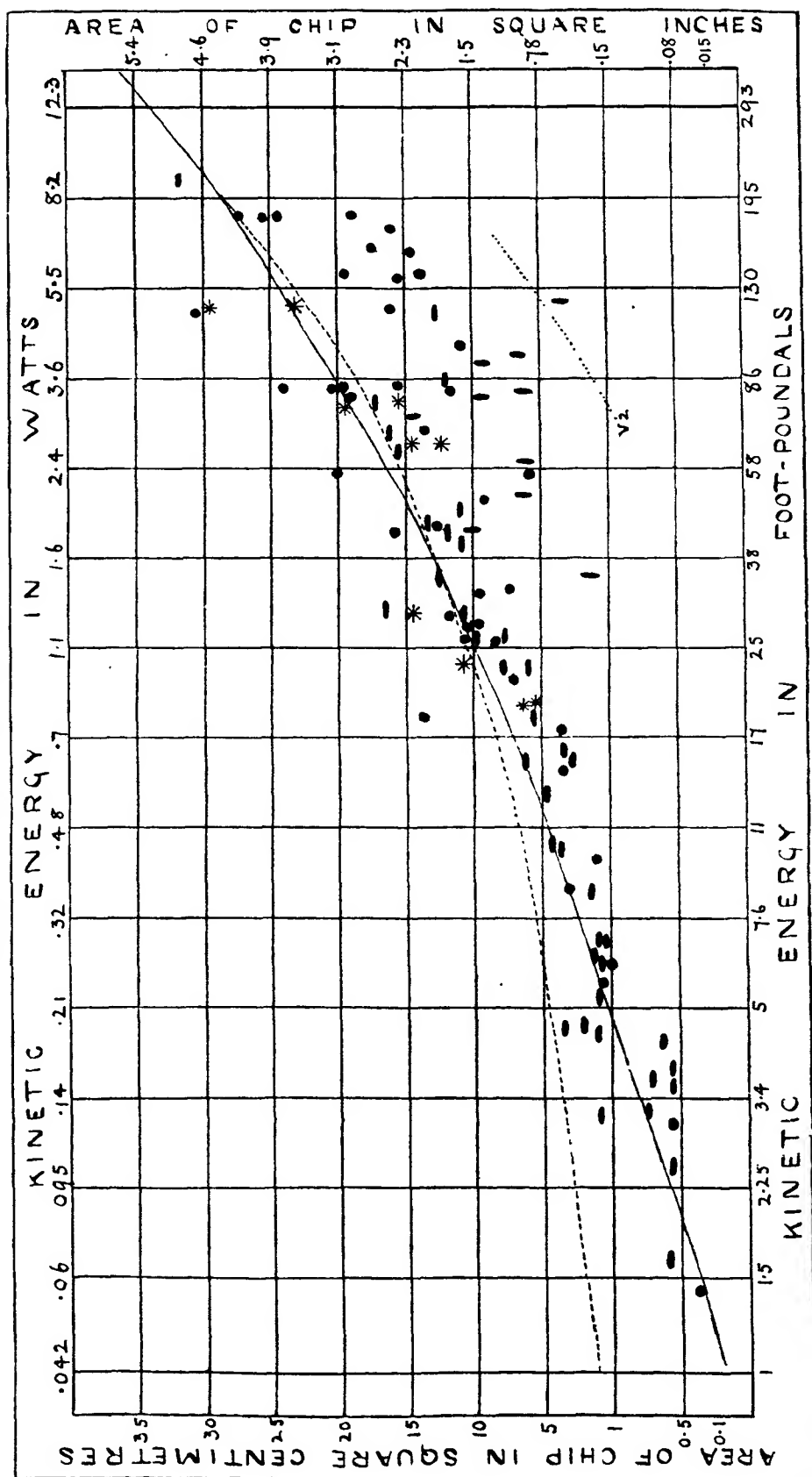
There are also other factors, such as the area of contact of the two surfaces at the moment of impact, which have their influence, but which under practical conditions it would be difficult to estimate.

Estimated favourable result.—With regard to the foregoing points, in dealing with a considerable number of experiments I have taken the average maximum of the effects. By this means the accidental association of unfavourable conditions is eliminated, and the results of the accidental association of favourable conditions are brought together under the various forces used.

There was some difficulty in obtaining a just average. For instance, in the case of the higher pressures shown in Table III, a number of the flints used were too thin, and would have given the same depth of chipping under a lower pressure. The difference in effect being that, under an excess of pressure, chipping tends to continue at the lower angles, and the later chips (*c x* or *f y* of Fig. 9) do not occur. Thus an actual average of the results would have been too low, as a fair average, while the "estimated favourable result" represents a nearer approximation to that which it professes to be. This quantity may seem rather vague, but practical experience shows that it justifies itself. In conducting a series of these experiments over a course of years, there is found to be an average maximum result which is comparatively constant, and which is only rarely exceeded to any considerable extent.

Concussions.—Table II shows the size of chip obtained by mechanical concussions acting along the planes of least resistance. The vertical abscissæ represent the

TABLE II.—THE EFFECTS OF CONCUSSION.



kinetic energy, with the equivalents in the metric and the English systems above and below. In order to obtain the relative space required to show the results, these are arranged in the geometrical progression of 1.5. The horizontal ordinates represent an approximate estimate of the area of the fractured surface of the chip (which is less than the multiple of the length and breadth), in square centimetres and the equivalent in square inches, on the left and right.

The records show the best results obtained in different series of experiments, the smaller chips obtained at the same time not being represented. These would have entirely filled up the lower right-hand portion of the table, and would have prevented an important point from being shown.

All these results, with the exception of that below the line marked "V 2" (which is also a best result from a series of experiments) are for impacts delivered at velocities of between 3 and 7 metres per second.

The circular dots represent "direct concussions" upon flints placed in a slight hollow in the ground; the perpendicular oval dots represent "direct concussions" upon flints held in the jaws of a screw press; the horizontal oval dots represent "reverse concussions"; and the stars "direct concussions" upon Brandon flint. It will be noted that these all fall within the same group.

Among this group of experiments there is one result standing entirely alone, namely, a chip of about 65 square centimetres area made by a kinetic energy of 9.4 watts. This is nearly twice the size of the "estimated favourable result." This result could not be included in the table without greatly reducing the scale on which it was drawn. Such exceptional effects should not, however, be lost sight of in our broader view of the problems involved.

Pressure.—Table III shows the results of movement under pressure (sled crushing). The outer scales for the vertical abscissæ represent the total load of the sled, the inner scales the estimated working pressure. The latter estimate is based on the fact that the total load is distributed over 2, 3, or 4 points of support, according to circumstances; this is taken at a maximum of two-thirds of the total load.

The horizontal traction is not shown on the table. From experiments made with this object, I found that up to a load of about 45 kilogrammes the force of traction necessary to draw the sled over the uneven edges of the flints was about equal to the total weight of the loaded sled. From observation of the progress of the work, I think that the greater part of the force of traction not infrequently operates upon one edge.

The horizontal ordinates show the depth of chipping upon the principle already explained.

The black circles represent the effects upon drift flint, the stars upon Brandon flint. The open circles are a series of measurements of the depth of chipping of 37 selected examples of the eoliths in the Prestwich collection, including the smallest and the largest. With one exception they are placed as a chain upon the line of the estimated favourable result.

TABLE III.—THE EFFECTS OF MECHANICAL MOVEMENT UNDER PRESSURE COMPARED WITH THE KENTISH EOLITHS.

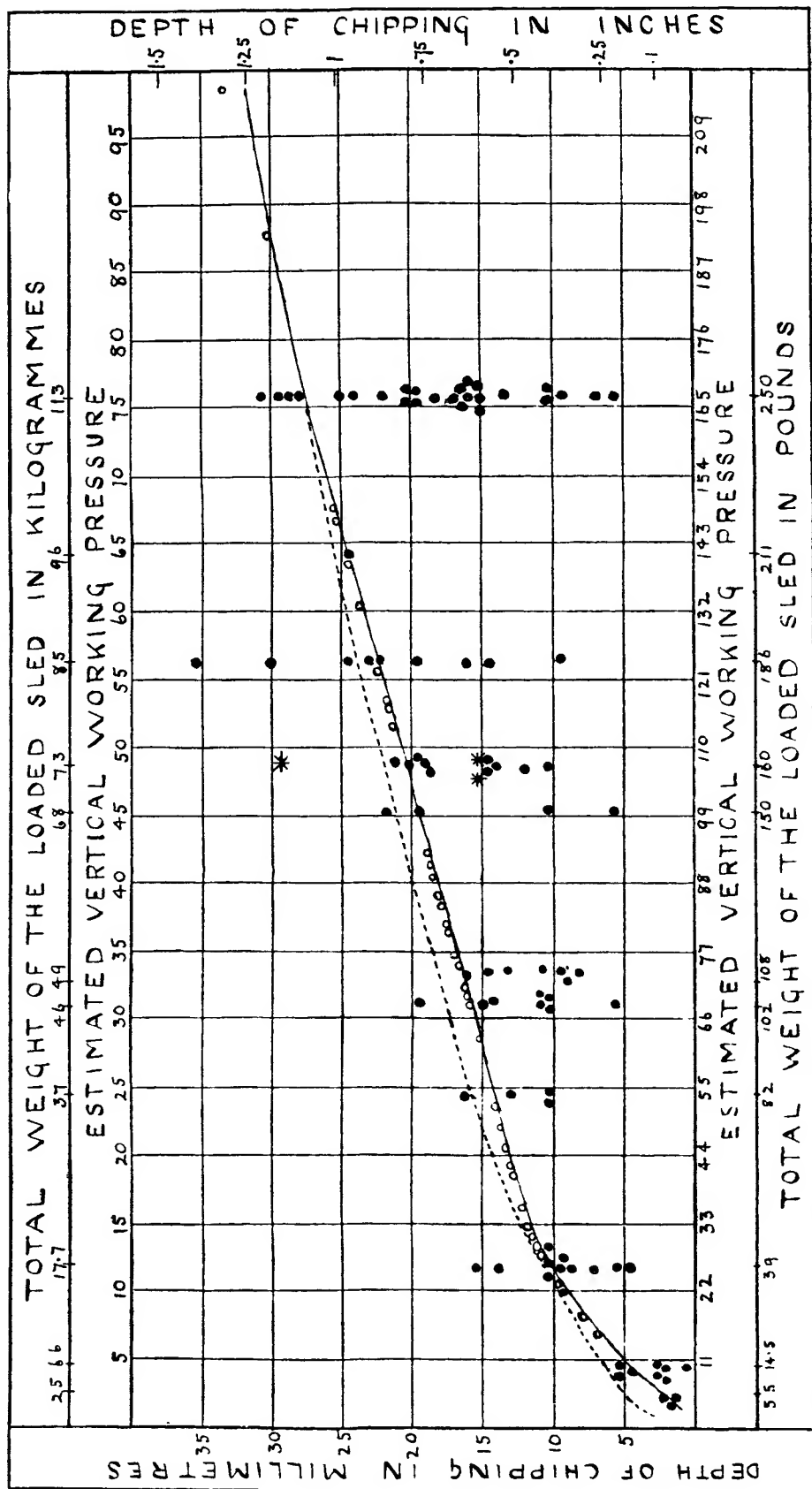


TABLE IV.—AREA OF CHIP OBTAINED BY PRESSURE.

Estimated total pressure.		Area of chip.		Ratio of pressure.	Ratio of size of chip.
Kilogrammes.	Pounds.	Square centimetres.	Square inches.		
139	306	8·0	1·24	1·0	1·0
101	222	6·0	0·93	1·375	1·33
89·5	197	4·0	0·62	1·56	2·0
57·3	126	2·75	0·425	2·42	2·9
43·5	96	2·0	0·31	3·18	4·0
21·2	46·7	1·0	0·155	6·54	8·0
8·0	17·6	0·2	0·031	17·4	40·0
3·5	7·75	0·05	0·00775	39·5	160·0

Table IV is a summary of the size of chip, estimated as in the case of Table II, obtained under various pressures. The effective working pressure is estimated, and cannot be accurately calculated. It must also depend much on the length of contact between the two surfaces, and this is constantly changing as the flint edge chips under the force.

But as the size of chip represents the favourable result obtained from a series of experiments, I assume a favourable concurrence of conditions in the application of the force, and estimate the total pressure (by the parallelogram of forces) as the resultant of the maximum estimated vertical pressure and the maximum estimated traction (= total weight of the loaded sled). It is probably but seldom that this estimate is fully realized, but I think it gives an approximate measure of the necessary force, as applied under practical conditions, to do the work indicated.

Ratio of force to result.—The continuous fine lines in Tables II and III, passing obliquely upwards from left to right, represent the line of the estimated favourable result. The broken lines are drawn to the hypothetical ratio that the results obtained in those two cases vary directly as the square root of the increase of the force. That is to say (in Table II), that with four times the kinetic energy the area of the chip will be twice as large; and (in Table III) under four times the vertical pressure the depth of chipping will be twice as great. This mathematical ratio is calculated backwards from the higher part of the line of favourable result.

To a certain point, the continuous and the broken lines closely correspond. We are not, however, dealing with the same kind of result in the two cases, for the size of chip removed in the case of pressure approximates to the square of the depth of chipping. Accordingly, if we look to the comparative ratios of the size of chip removed, and of the pressure given in the last two columns of Table IV, we find

that with the greater pressures the results approximate to the ratio that the size of chip varies directly as the pressure; that is, four times the pressure gives more than four times (instead of twice) the size of chip. Thus the ratio of force to effect is not the same under the operation of pressure as it is in the case of concussions, although it chanches to appear so if the depth of chipping in the one case be compared with the area of the chip in the other.

All three ratios, however, break down under the lower forces. In the case of concussions, this breakdown occurs below a kinetic energy of about 1 watt in the case of impacts delivered at velocities of from 3 to 7 metres per second, and also at higher kinetic energies at low velocities of less than somewhere about 2 metres per second, as suggested by the separate line marked "V 2." This line (V 2) has not been satisfactorily worked out, and is only a suggestion. It would be obviously unsound to compare a favourable result under one force with an unfavourable effect under another, and it is peculiarly difficult under such low velocities to establish a favourable result which shall be proportionally comparable with that obtained under higher velocities.

Under pressure the breakdown occurs below the estimated maximum working pressure of about 10 kilogrammes. A similar state of things may be noted in Table IV, where under the lowest force about $\frac{1}{16}$ of the pressure gives $\frac{1}{160}$ of the size of the chip (as compared with the highest force).

Supposing these results to be within moderate limits of error, they seem to suggest that there is something in the nature of a "critical point," above and below which the ratios are different.

If it were justifiable to suppose that the upper ratio would be continued for a considerable increase of pressure beyond that used, we might calculate that a depth of chipping of 60 millimetres would require movement under an effective working pressure of about 370 kilogrammes.

Through the kindness of Sir Ray Lankester I have been enabled to obtain measurements of the series of sub-crag flints deposited by him in the British Museum. The highest depth of chipping (in millimetres) is a rather doubtful record of 62, but 58·7, 58, and 57·3 were also observed; the lowest record being 15·3.

The striation of flint surfaces.—I have made some experiments in the scratching of flints with quartz grit, and find that under pressures of from 6·4 to 9·0 kilogrammes (14 to 20 lbs.), considerable scratching takes place, but it is very shallow. When the pressure is increased to 23 kilogrammes (50 lbs.) the scratches become deeper, but are generally fewer in number and very short, owing to the fact that under the greater pressure most of the particles of quartz grit become crushed before they have time to effect any scratching.

I have endeavoured to estimate the depth of the scratching made under a pressure of 23 kilogrammes, by means of the fine focussing adjustment of a microscope reading in thousandths of an inch; if I am not mistaken it appears to be about 0·002 inch or 0·05 millimetres. The deepest scratch I can find in my own

collection upon a flint implement is about 0·003 inch or 0·075 millimetre, estimated by the same method. I believe that deeper scratches than this occur occasionally on flints from the Kentish plateau, and perhaps more frequently in the basement bed of the crag, and I think that they must have been made by contact with some mineral tougher than quartz grit; at least tougher than that which I have used.

The great majority of the scratches upon the Kentish flints are, however, of a less depth than 0·001 inch or 0·025 millimetre, estimated in the same manner as the above.

Mr. J. Reid Moir¹ has recently drawn attention to the influence of weathering upon the scratching of flints. The flint surfaces that I used in these experiments were in no case corroded; they were either fresh fractures or slightly patinated (glossy), and were all drift flint.

Doubtless much of the scratching observed upon surface flints, to which attention has been directed by some recent theories, has been caused by agricultural operations. It sometimes occurs upon gun flints which are not more than 250 years old.

Application to natural agencies.—In comparison with the foregoing results, we have now to consider the forces available in Nature to effect chipping.

Table V shows the kinetic energy generated by stones of certain specified weights, when swept along at various velocities by moving water.

TABLE V.—KINETIC ENERGY OF MOVING STONES IN WATER.²

Weight of stone in air.		Specific gravity of stone.	Velocity.		Kinetic energy.	
Kilo- grammes.	lbs. ozs.		Metres per second.	Miles per hour.	Watts.	Foot- pounds.
1·5	3 4·8	2·3	0·5	1	0·106	2·52
"	" "	"	1·0	2½	0·425	10·1
"	" "	"	2·5	5½	2·65	63
0·1	0 3·55	"	5·0	11	0·708	16·8
1·5	3 4·8	"	"	"	10·6	251
4·0	8 13·2	"	"	"	28·3	673
1·5	3 4·8	"	9·0	20	34·35	815
"	" "	"	15·0	34	95·5	2263

¹ J. Reid Moir, "The Striation of Flint Surfaces," *Man*, 1914 (90).

² I am indebted to Dr. J. W. Evans for some assistance in the consideration of this problem.

Twice the weight of stone gives double the kinetic energy, while other weights follow in similar proportion. Differences in specific gravity would also make proportionate differences in the result. With regard to rivers, it may be remarked that the average velocity of a slow river is from one to three miles per hour, while the average velocity of a torrent may reach twenty miles per hour. We are not, however, concerned with the average velocity of the current, but with the velocity at which stones would be swept along for short distances in eddies, rapids, and the like.

I have little information on this point, but it is well to remember that the carrying power of currents varies as the sixth power of the increase of velocity; that is to say, three times the velocity generates 729 times the carrying power. With regard to the sea, it may be noted that during storms pebbles hurled up by the waves will sometimes break the windows of lighthouses at heights of about 100 metres above the sea. In order that a body might reach such a height, in a vertical course, it would have to be projected upwards at a velocity of a little over 44 metres per second. Such a high velocity as this would be exceptional even in the operation of marine waves: I do not suggest that it would ever be equalled in ordinary river work.

It is not such exceptionally violent forces which are the most important. As we have already seen, it is the more moderate forces which best induce selective chipping along the planes of least resistance. Generally speaking, it is such selective chipping under mechanical force which tends to simulate the guidance of intelligent design, rather than the more promiscuous effects of violent forces.

With regard to sub-soil pressure, I have obtained a number of weights of different soils, some of which have been kindly furnished for me by Mr. F. Sadler, the district surveyor of Acton, and others I have weighed myself. From the average of these I have calculated the pressure which falls upon stones according to their area and to their depth beneath the surface. Dry sand is the lightest, being 10 per cent. lower, while heavy ballast and sand is 10 per cent. higher, than the values given in the table. The last columns show the additional pressures due to various thicknesses of overlying snow or ice, which would have to be added to the other pressures given. All these pressures are calculated from surface density, and are consequently below the actual pressures that would be attained.

In this table the pressures are given in kilogrammes: to convert into pounds, multiply by 2 and add 10 per cent. to the product.

Turning back to Table III, it will be noted that the chain of open circles (the Kentish coliths) are placed along the line of the "estimated favourable result," so that the pressure which would be needed to produce a similar depth of chipping under experimental conditions is indicated. It would be imprudent to push the analogy too far, as experimental conditions must differ from natural conditions. Even if the conditions were strictly comparable, it would not be possible to apply the necessary pressure shown in Table III to the depth in the sub-soil at which

such pressure is exerted upon a flint of a given size, shown in Table VI. In some cases the pressure received by a flint would be distributed over its area, so that only a small fraction would be available as effective working pressure on the edge.

TABLE VI.—SUB-SOIL PRESSURES UPON STONES AT VARIOUS DEPTHS.

Size of stone.		Pressure in kilogrammes corresponding to depth in metres or feet.					Add for covering of		
Square centimetres.	Square inches.	0·305 m. or 1·0 ft.	1·0 m. or 3·28 ft.	3·0 m. or 9·84 ft.	6·1 m. or 20·0 ft.	20·0 m. or 65·6 ft.	Snow. 3·05 m. or 10·0 ft.	Ice. 30·5 m. or 100 ft.	Ice. 100 m. or 328 ft.
32·3	5	1·87	6·13	18·4	37·5	122·6	0·8	92·5	303·5
60	9·3	3·48	11·4	34·3	69·5	228	1·5	172	565
200	31	11·6	38	114	232	762	5	574	1882
500	77·5	29	95	285	579	1902	12·6	1435	4705
929	144 (=1 sq.ft.)	53·8	176	530	1077	3536	23·5	2665	8743

In other cases—and not infrequently—a number of stones would become wedged together during the process of solifluction, in such a manner that a great part of the pressure received upon the whole would be concentrated upon one; a large working force would thus be brought into action.

Prehistorians who have discussed these problems have been apt to overlook the importance of the difference between the inertness of the still condition, that is, the static force in equilibrium, and the dynamic forces which come into play so soon as differential movement is set up within the mass of a geological deposit.

The bulb of percussion.—Tables VII to X represent graphically the technical characters of the flakes or chips produced by different methods. These characters are shown as percentages of the total results taken as they chanced to come, and are classified under the following headings, which constitute the vertical abscissæ:—

F.E.—Nearly “flat” chips (that is without bulb) with *éraillure*, the latter being sometimes excessive.

B.E.—With poorly-developed bulb and *éraillure*.

F.—Nearly flat chips, without any bulb.

B.—With poorly-developed bulb.

B.B.—With well-developed plain bulb.

B.B.E.—With well-developed bulb and *éraillure*: this is the ideal, but not the exclusive, character of human flaking.

C.—With excessively strong conical bulb.

C.E.—As C, but with *éraillure*.

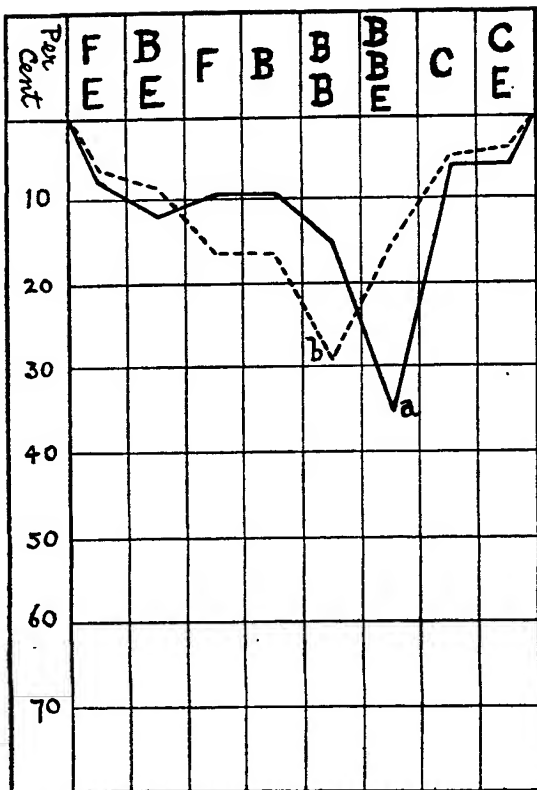


TABLE VII.—*a*, MOUSTERIAN FLAKES.
b, RUDIMENTARY HAND FLAKING.

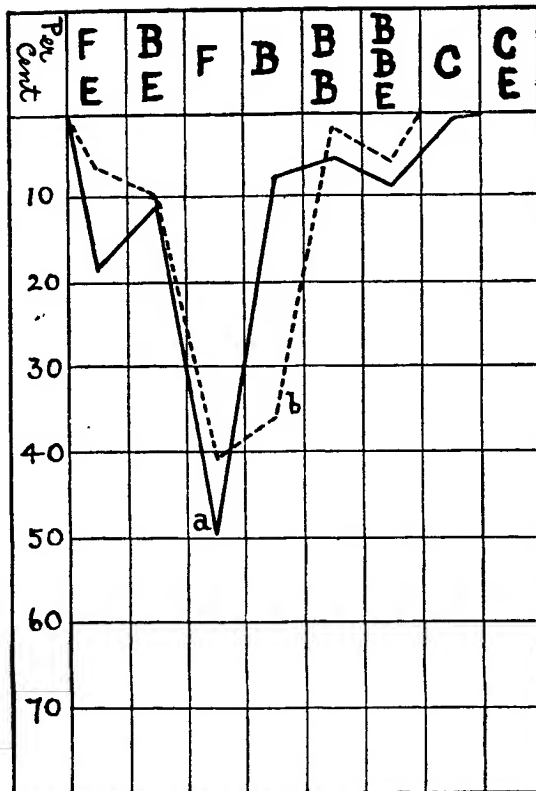


TABLE VIII.—*a*, INCURVED PALÆOLITHIC FLAKING.
b, REVERSE FLAKING.

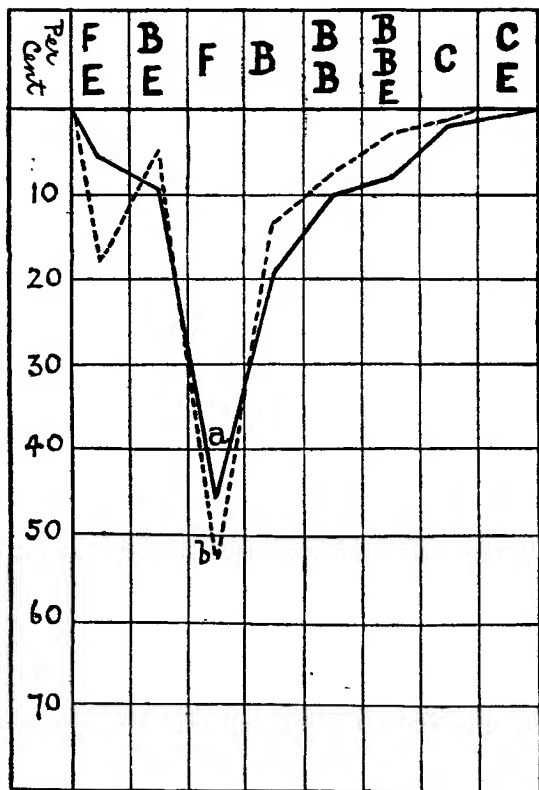


TABLE IX.—*a*, DIRECT CONCUSSIONS.
b, REVERSE CONCUSSIONS.

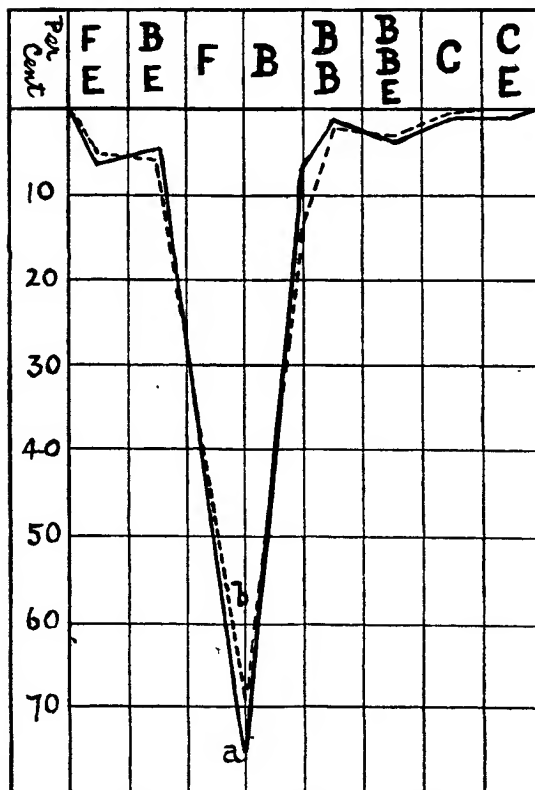


TABLE X.—*a*, "DEAD" CRUSHING.
b, THE SLED EFFECTS.

COMPARATIVE CHARACTERS OF THE "BULB OF PERCUSSION."

It must be noted that all the chips coming into the B.B.E. column would pass as human flakes if found upon a prehistoric working floor.

The number of specimens and other details on which the percentages are based are as follows:—

Table VII. (a) 274 Mousterian flakes from the Stoke Newington palæolithic floor. (b) 195 flakes made from drift flint by myself by the most primitive method of striking the flint held in the left hand by a quartzite pebble held in the right hand, without regard to the form produced.

Table VIII. (a) 310 flakes from a palæolithic working site, which as a whole definitely belong to the incurved group, to which only 17 of the Stoke Newington flakes shown on the former table can be referred. Incurved flakes show a high degree of skill, and yet they controvert the conventional idea of the technical characters of an ideal human flake. (b) 141 flakes made by myself from drift flint by reverse flaking. These are all very rough chips and show no resemblance to the incurved flakes in their form. It doubtless requires a special knack, which I have been unsuccessful in mastering, to obtain a good result by reverse flaking.

Table IX. (a) 239 chips made by mechanical direct concussions. These show a much larger percentage coming into the B.B.E. column than the next group. (b) 147 chips made by mechanical reverse concussions. These effects show a resemblance to the incurved flakes in the comparatively large percentage coming into the F.E. line.

Table X. (a) 83 pressure chips by dead crushing associated with a minimum of differential movement, from the base of the Tertiary formations at Harefield and other situations where these conditions are satisfied. (b) 369 chips made by the sled experiments of movement under pressure. These groups of pressure chips are difficult to classify under the same headings as others. The predominant tendency of pressure chips is to show a broad swelling without the clear-cut outline of a cone springing from a point of impact. I endeavoured to make the best classification that I could, and then plotted the percentage points in a different way from that adopted in the other cases in order to suggest the difficulty.

In general summary of these technical characters it must not be forgotten that they are here judged irrespective of the form of the flake as a whole. Viewed broadly, there can be no doubt that there are well-defined characters which are dominant in flaking or chipping by different methods. Still there is nothing absolute about these characters, and there is always a certain percentage produced by any method, which might well be mistaken for the product of a totally different method. Whatever one finds to be general or usual one also finds to be occasionally violated by an exceptional combination of adventitious conditions.

Associated with flatness of the flake or chip, there is a corresponding shallowness in the facet left by the removal of the flake. This, within similar limitations to those which are apparent in the percentages plotted on the tables, is often a very useful character.

Rippling.—The rippling of the fractured surfaces is sometimes a rather elusive character to determine, but it may have some value in the case of “dead crushing.” From material at present at my disposal it would appear that only about 11 per cent. of the chips by this method show ripples of any strength, while the greater number of the chips show an unusual absence of any sign of rippling. With movement under pressure I think that there is less rippling than with concussions, but there is certainly much more than with dead crushing. The strongly rippled surfaces seem to approximate to 50 per cent. in most other methods, although there may be rather more rippling in the case of “reverse chipping” and “reverse flaking” than in the “direct” method. The characters of flakes and chips are illustrated in Plate XXXIX, Figs. 4 to 7.

Inner chipping angles.—I have plotted a series of observations of these upon squared paper and find that in the most primitive style of flaking in the hand, and also in most mechanical methods, the chief concentration is from 60 to 65 degrees. From this point, the curve drops more rapidly to 40 degrees and less rapidly on the other side to 90 degrees, with occasional records beyond these points upon either side.

Thus in the flaking or chipping angle, I have been unable to find any difference between the most primitive style of hand flaking and mechanical concussions. Ordinary rough human flaking, such as that of the Mousterian working-floor at Stoke Newington, shows the chief concentration at about 70 degrees, with but few below 50 or above 90 degrees. More advanced styles of human work may reach an average of 87 degrees, with a considerable number exceeding 90 degrees.¹ On the other hand, mechanical pressure also gives high angles of chipping, except where the pressure employed is in excess of that needed to do the work; in the latter event the angles tend to be lower.

Although the evidence of the angles, taken by itself, is thus full of contradictions, there is a point of comparison between the angles in the edge-chipping produced by mechanical movement under pressure, and the angles of the Kentish eoliths, which may be significant. Reference to the previous diagram (Fig. 9) will show that the inner chipping angles in the sled effects fall into three stages: (*a*) the earlier chips that strike back the farthest, (*b*) the middle chips, and (*c*) the final blunting of the edge. I have added together a series of measurements of these angles, in the two cases, and averaged the products, with the following result:—

¹ High angles are not essential to the making of good flakes. Much of the modern Brandon work is executed at about 75°, while some is below 70°. It will be understood that in the making of core-implements the reverse generally holds, that is, the lower the angle the better the work.

TABLE XI.—COMPARISON OF CHIPPING ANGLES.

Stages of edge-chipping.	Experimental sled effects.		Kentish eoliths (Prestwich collection).	
	Number of measurable examples.	Average angle in degrees.	Number of measurable examples.	Average angle in degrees.
First	42	55·45	37	56·1
Second	38	76·5	29	83·3
Third	35	106·74	37	114·4

The slight differences to be noted between the above two series are instructive. In the sled effects a smaller proportion show the final blunting, and, in addition, this final blunting is less obtuse than in the case of the eoliths. These features point to the conclusion that the eoliths, as compared with the sled effects, have been subjected to the more prolonged operation of a minimum force. As we have seen, excess of pressure tends to give lower angles of chipping.¹

It appears to me that the comparison of the chipping angles confirms the conclusion reached from the comparison of the forms, namely, that the Kentish eoliths are due to the operation of mechanical movement under pressure.

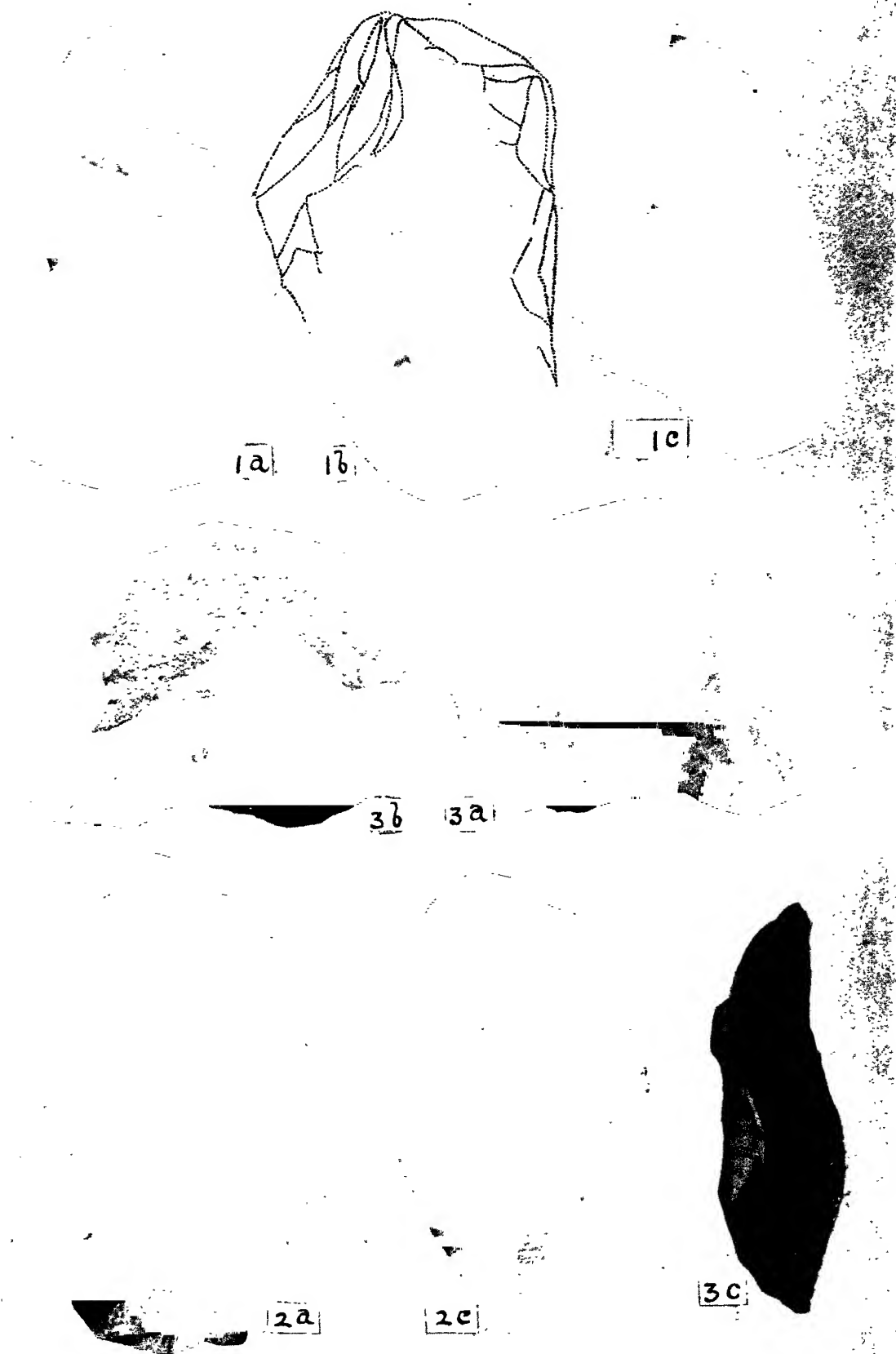
15. CONCLUSIONS.

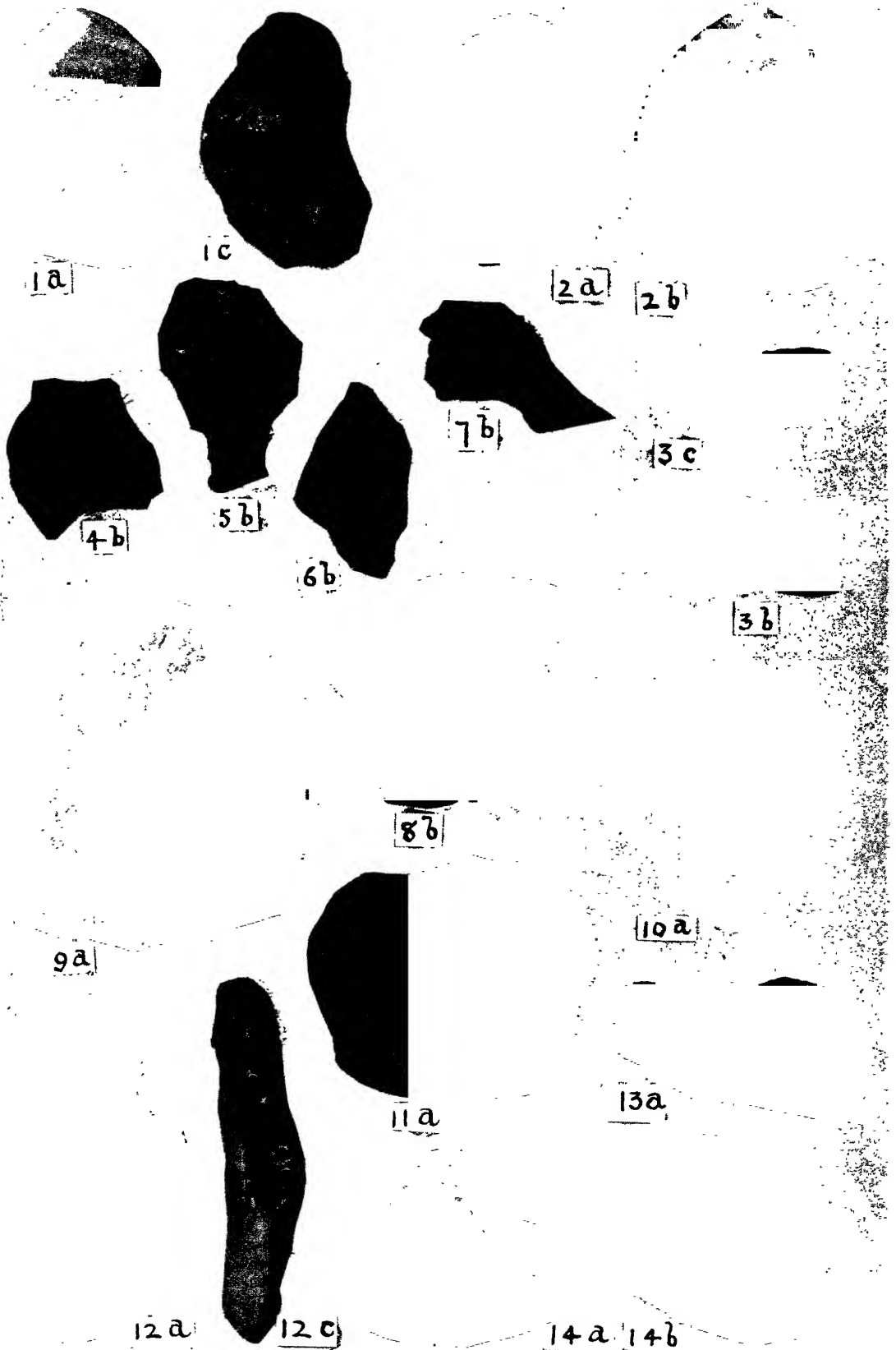
In the investigations detailed in the foregoing paper, I have not confined attention to those points which bear directly, or even indirectly, upon the problem of the eoliths, but I have aimed at dealing with the elementary conditions of flint chipping on general lines. But as the controversy which turns upon the problem of the eoliths is a burning one at the present time, I will set down the conclusions at which I have arrived in this matter as clearly and concisely as possible.

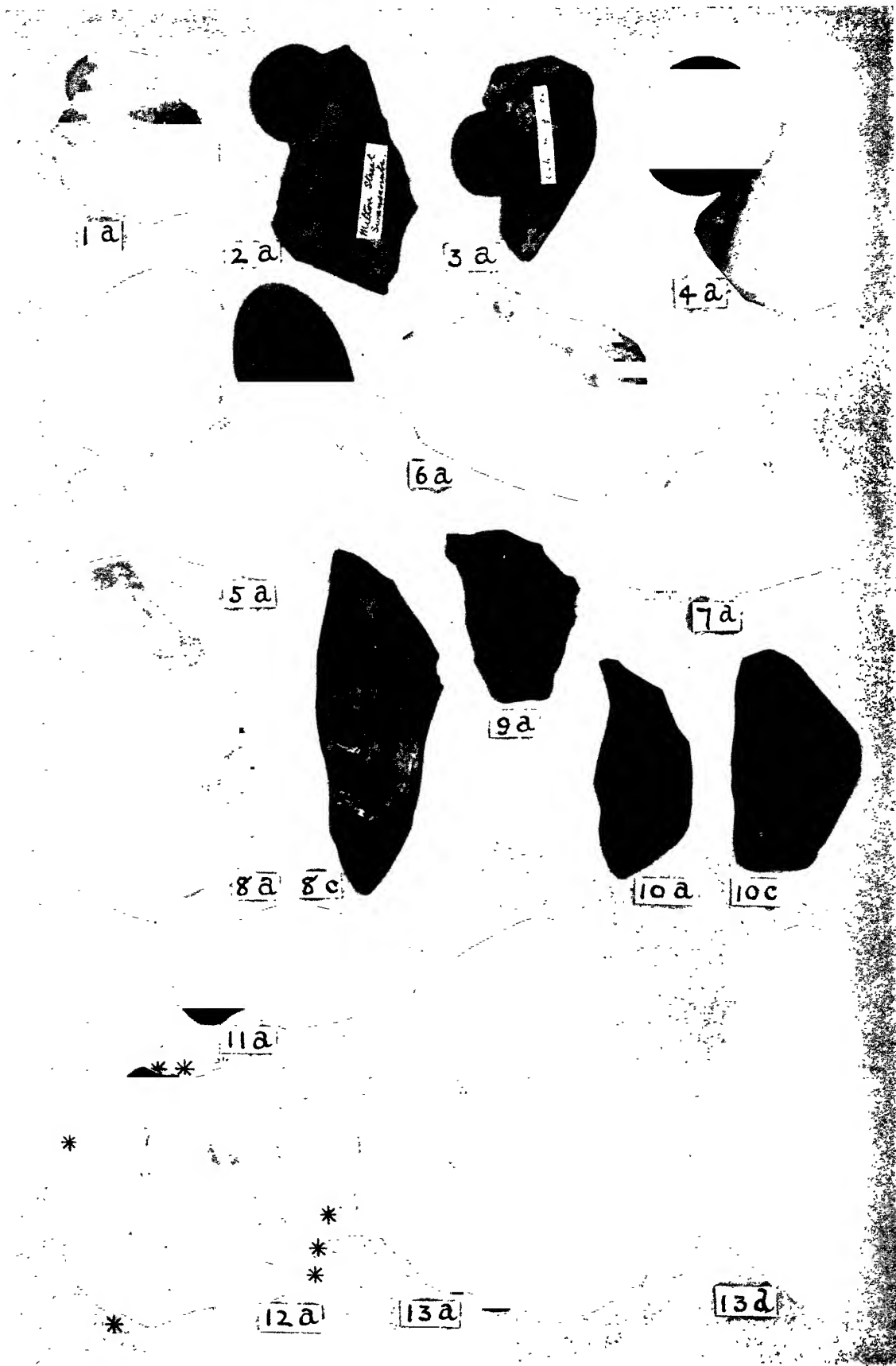
(1) That the application of mechanical force, particularly of differential movement under pressure, acting upon flints of suitable shape, produces edge-chipping which has the same characteristics as that of the eoliths.

(2) That the amount of pressure required to effect the chipping observed upon eoliths of Kentian type is found within the limits of superficial drift deposits, if the static force in equilibrium should become a dynamic force through movement taking place.

¹ It may be noticed that there is an apparent contradiction between this statement and that previously made in Section 5, that, *other things being equal*, a low angle chip requires less force than a high angle chip. The explanation lies in the fact that under the special conditions dealt with here, the low angle chip has of necessity such a much larger area than the high angle chip that the influence of the angle is counterbalanced.







(3) That the striated surfaces associated in the field with eolithic chipping indicate that the flints have been subjected to those differential movements under pressure which experiment proves to be capable of effecting the chipping.

(4) That the larger chipping of the sub-crag flints has not been reproduced by experimental methods, because differential movements under adequate pressure have not yet been employed in flint experiments.

(5) That as a matter of personal judgment, based upon more than twenty years of specialized research, it is my opinion that the chipping upon the sub-crag flints presents non-human characteristics, and follows the same general lines that are observed upon a smaller scale in the operation of small forces.

(6) That the powerful striations associated with the sub-crag flints are suggestive of equally powerful forces having operated upon them, which it is reasonable to suppose (arguing from the known lesser to the unknown greater) would also be capable of effecting the chipping.

(7) That extensive flint-chipping is found in the early Tertiary formations under circumstances which preclude the possibility of the intervention of man, and proving the chipping to have been produced *in situ* by sub-soil pressure.

(8) That the best and most characteristic of the eoliths present features which point to pressure as their cause; but that with these are many which were probably caused by the accidental concussion of one stone against another in the course of natural erosion, which, acting along the planes of least resistance of the flint, frequently produces a deceptive simulation of deliberate workmanship.

In conclusion, let me say that I have no prejudice against the existence of man in the Pliocene period: it is simply a question of obtaining the facts to prove his existence at that time. But in view of the evidences detailed above it appears to me imprudent—indeed, to my mind, I would say practically impossible—to accept these chipped flints as throwing light upon that early chapter of human, or immediately pre-human, history, which I, no less than the most enthusiastic of my opponents, should like to see opened up before us as clearly as the Palaeolithic Age now stands revealed.

DESCRIPTION OF THE PLATES.

The scale is not quite uniform, but is approximately half natural size, or rather less. The letters against the numbers of the figures have the following significance: *a*, the convex side of the specimen; *b*, the basal plane, or the flatter side, or the inner face of flakes and chips; *c*, the edge view; *d*, the section.

PLATE XXXVIII.

Fig. 1.—See page 420.

Fig. 2.—See page 422.

Fig. 3.—See page 422.

PLATE XXXIX.

Fig. 1.—See page 421.

Fig. 2.—See page 421.

Fig. 3.—Wave action upon a modern sea beach ; selective α chipping shown in the side view (*c*), the basal plane (*b*) being unchipped.

Fig. 4.—Ideal human flake, showing sharply defined conical bulb, partly cut away on one side by the *écaillage*.

Fig. 5.—Incurved flake, showing absence of bulb and strong rippings.

Fig. 6.—Ideal chip by mechanical reverse chipping. The ideal chip by direct chipping is intermediate in character, between Figs. 4 and 6.

Fig. 7.—Ideal chip by pressure. The bulb is a broad swelling, and there is no rippling.

NOTE.—None of the above characters of flakes and chips are constant, but they represent marked tendencies.

Fig. 8.—Ideal frost scale. The rippings are roughly concentric to a fragment of fossil.

Fig. 9.—Sled crushing. High-angle edge-chipping, assuming a pseudo-Mousterian form. Brandon flint. All the other examples of experimental crushing are made from drift flint.

Fig. 10.—Sled crushing. Straight-edged form.

Fig. 11.—Sled crushing. Edge-chipping with incipient notches.

Fig. 12.—Sled crushing. Single notch. This is one of the most frequent forms produced.

Fig. 13.—Sled crushing. Double notch, or incipient point.

Fig. 14.—Cart-wheel crushing. Point with reverse chipping on either side. This illustrates the production of this form by the fortuitous application of pressure.

PLATE XL.

Fig. 1.—Striated Palæolithic flake from the Kent Plateau, with eolithic notch made subsequently to its patination. It is photographed against a pebble to illustrate the theory of the production of the notch by pressure against another stone.

Fig. 2.—Palæolithic trimmed flake from Swanscombe, with eolithic notch made subsequently to its patination, similarly photographed.

Fig. 3.—Eolith from the pit of 1902 at Ash, on the Kentish Plateau, photographed in the same manner as Figs. 1 and 2.

Fig. 4.—Crushing. Unsymmetrical point, made by pressure against the stones of a gravel path.

Fig. 5.—Crushing in the same manner as Fig. 4.

Fig. 6.—Crushing. Unsymmetrical short point.

Fig. 7.—Crushing. Point.

Fig. 8.—Sled crushing. This shows a marked approach towards the rostro-carinate form.

Fig. 9.—Cart-wheel crushing. Small rostro-carinate.

Fig. 10.—Cart-wheel crushing. Small but very perfect rostro-carinate. The α chipping in this specimen has cut so far back into the stone at a high angle, that chipping in the δ direction has taken place from the carina.

NOTE.—Figs. 4 to 10 illustrate the close association of the double-notches-with-point and the rostro-carinate form. They differ only in relative proportions : the essential conditions of the chipping are the same.

Figs. 11-13.—Dead crushing from the Reading Beds at Harefield. Fig. 11 shows a notch squeezed out in one piece by excess of pressure. Fig. 12 shows edge-chipping at the points of contact with the stones on which it rested. The position of the chips is indicated by stars, one part having a shallow notch with three chips. Fig. 13 is a pseudo-hand-axe : the admirable bevel of the cutting edge is shown in the section.

MISCELLANEA.

PROCEEDINGS OF THE ROYAL ANTHROPOLOGICAL INSTITUTE, 1914.

January 20th, 1914.

Annual General Meeting. (See p. 1.)

February 10th, 1914.

Special General Meeting. Upon the motion of the HONORARY SECRETARY, seconded by the TREASURER, Mr. H. G. A. LEVESON took the chair.

The ASSISTANT SECRETARY read the notice convening the meeting.

The TREASURER moved the Resolution of which notice had been given, viz., that the Regulations contained in the printed document submitted to the meeting and for the purposes of identification subscribed by the Chairman thereof, be, and the same are hereby authorized, and that such Regulations be and they are hereby adopted as the Articles of Association of the Institute to the exclusion of, and in substitution for, all existing articles thereof.

Dr. W. E. DERRY having seconded the foregoing Resolution, the CHAIRMAN put the same to the Meeting, which approved the said Resolution, there being nine Fellows present, and nine votes in favour of, and none against, the said Resolution.

The CHAIRMAN for the purpose of identification subscribed the printed document submitted to the meeting and a copy of the notice convening the meeting, and declared the foregoing Resolution carried.

February 10th, 1914.

Ordinary Meeting. Sir EVERARD IM THURN, K.C.M.G., C.B., Vice-President, in the chair.

The minutes of the last meeting were read and confirmed.

Professor CARVETH READ read a paper on the "Psychology of Magic."

The paper was discussed by Miss DURHAM, Mr. ALLEN UPWARD, Mr. TORDAY and the TREASURER.

The hearty thanks of the Institute were accorded to Professor Carveth Read for his valuable contribution to Anthropology.

February 24th, 1914.

Ordinary Meeting. Professor KEITH, President, in the chair.

Miss A. WERNER read a paper on "The Bantu Coast Tribes of the East Africa Protectorate," illustrated by lantern slides.

The paper was discussed by Mr. RAY, and Miss WERNER replied.

The hearty thanks of the Institute were accorded to Miss Werner for her valuable paper.

March 10th, 1914.

Ordinary Meeting. Professor KEITH, President, in the chair.

Mr. ALLEN UPWARD read a paper on "The Magical Siege of Troy."

The paper was discussed by Dr. HILDBURGH, Mr. YOUNG, the SECRETARY, and Miss DURHAM, and Mr. UPWARD replied.

The hearty thanks of the Institute were accorded to Mr. Allen Upward for his stimulating and interesting paper.

Mr. COLLIER then described a number of stone implements sent from West Africa, the Gold Coast and Northern Nigeria.

March 24th, 1914.

Ordinary Meeting. Professor KEITH, President, in the chair.

Sir EVERARD IM THURN read a paper on Bellingshausen's visit to Ono i lau.

The paper was discussed by Dr. GLANVILLE CORNEY, Mr. BASIL THOMSON, Mr. EDGE-PARTINGTON, Dr. MAUDSLAY, and the TREASURER, and Sir EVERARD replied.

The hearty thanks of the Institute were accorded to Sir Everard.

April 28th, 1914.

Ordinary Meeting. Mr. T. A. JOYCE, Vice-President, in the chair.

Miss FREIRE-MARRECO read a paper on "Some Hopi Textiles from the Pueblo of Hano," illustrated by a number of exhibits and by photographs and diagrams.

The paper was discussed by Dr. H. S. HARRISON and Miss SKRINE, and Miss MARRECO replied.

The hearty thanks of the Institute were accorded to Miss Marreco.

May 12th, 1914.

Ordinary Meeting. Mr. T. A. JOYCE, Vice-President, in the chair.

The minutes of the last meeting were read and confirmed.

Dr. W. H. R. RIVERS read a paper on "Colour Blindness and Race."

The paper was discussed by Dr. BATESON, Dr. C. S. MYERS, Dr. WATSON, and Dr. RIVERS replied.

The very hearty thanks of the Institute were accorded to Dr. Rivers for a very interesting and stimulating paper.

Mr. A. L. LEWIS, Officier d'Académie, then read a paper on "Standing Stones and Stone Circles" in Yorkshire. The paper was illustrated by lantern slides.

The paper was discussed by Mr. PARKYN.

The very hearty thanks of the Institute were accorded to Mr. Lewis for his very interesting paper.

May 26th, 1914.

Ordinary Meeting. Mr. A. L. LEWIS in the chair.

The minutes of the last meeting were read and confirmed.

Miss A. C. BRETON made an exhibit of pictures and pottery from Grand Canary.

The SECRETARY, in the unavoidable absence of the author, owing to illness, read a paper on "The Rabhas of Assam," by Mr. Friend Pereira. The paper was illustrated by photographs.

The paper was discussed by Dr. YOUNG, the CHAIRMAN, the SECRETARY, and Dr. DERRY. A hearty vote of thanks was accorded to Mr. Friend Pereira for his paper.

June 16th, 1914.

Ordinary Meeting. Professor KEITH, President, in the chair.

The minutes of the last meeting were read and confirmed.

Papers were read on the Cheddar Man by Professors PARSONS and SELIGMAN.

Professor SELIGMAN described the implements found in the cave, and Professor PARSONS described the physical remains. The descriptions were illustrated by a number of exhibits, including the skull itself and other bones, as well as flint and bone implements.

The papers were discussed by Professor BOYD DAWKINS, Mr. REGINALD SMITH, Professor THANE, Mr. GOUGH, Mr. HAZZLEDINE WARREN, Mr. PARKYN, and the PRESIDENT.

Professor SELIGMAN and Professor PARSONS replied.

The very cordial thanks of the Institute were accorded to Professors Seligman and Parsons for their very interesting papers, and to Mr. Gough for his kindness in permitting the skull to be exhibited with the other remains found in the cave. The opinion was expressed that it would be a great gain to science were it possible to have the skull thoroughly cleaned.

October 20th, 1914.

Ordinary Meeting. Professor KEITH, President, in the chair.

The minutes of the last meeting were read and confirmed.

Mr. J. EDGE-PARTINGTON made an exhibit of a Purchase Deed executed by John Batman with regard to some tracts of land at Port Philip (Geelong), Victoria, early in the 19th century. Mr. S. HAZZLEDINE WARREN made an exhibit of flints, pottery, and bones indicating methods of preserving such objects. Professor C. G. SELIGMAN exhibited some stone pots and a head-rest of the Bisharin; and Mr. A. W. FULLER made an exhibit of some Tasmanian skulls, which was discussed by the PRESIDENT, who exhibited typical Tasmanian skulls from the Royal College of Surgeons, by Dr. H. O. FORBES and the Rev. Mr. FULLER.

Mr. D. MACRITCHIE was unable to read his paper on "The Double-walled Towers of Scotland," as the Epidiascope, owing to a misunderstanding, was not available. Accordingly Mr. MACRITCHIE kindly consented to read his paper on October 22nd instead.

October 22nd, 1914.

Ordinary Meeting, adjourned from October 20th. Professor KEITH, President, in the chair.

Mr. D. MACRITCHIE read his paper on "The Double-walled Towers of Scotland," illustrated by lantern slides.

The paper was discussed by Messrs. A. L. LEWIS, E. A. PARKYN, and Dr. HARRY CAMPBELL, and the lecturer replied. The thanks of the meeting were returned to the lecturer.

November 17th, 1914.

Ordinary Meeting. Professor KEITH, President, in the chair.

Mr. R. A. SMITH read some notes on Stone Implements from gravel beds in South Africa collected and exhibited by Major E. R. COLLINS. The paper was discussed by Dr. VISICK, Mr. HENRY BALFOUR, Mr. E. A. PARKYN, and Mr. STOPES, and Mr. SMITH replied.

The Hon. JOHN ABERCROMBY read a paper on "The Prehistoric Pottery of the Canary Islands and its Makers," illustrated by lantern slides. The paper was discussed by Mr. HENRY BALFOUR, the PRESIDENT, Mr. PEAK, Dr. SHRUBSALL and Mr. CRAWFORD, and Mr. ABERCROMBY replied. A hearty vote of thanks was accorded to Major COLLINS, Mr. SMITH, and Mr. ABERCROMBY.

December 15th, 1914.

Ordinary Meeting. Professor KEITH, President, in the chair.

Mr. LOUIS C. G. CLARKE exhibited three jadeite carvings from Copan, Honduras. The exhibit was discussed by Messrs. T. A. JOYCE and C. FLEISCHMANN.

Mrs. F. BOYLE read a paper on the "Lala of Northern Nigeria."

The paper was discussed by Professor SELIGMAN, Mr. RAY, and Dr. HARRISON.

The thanks of the meeting were returned to the lecturer.

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NOTE.—The Numbers in ordinary type refer to the pages; the numbers in Clarendon type are the reference numbers of MAN, 1914; where necessary the page references to MAN are added in brackets. For collected references see especially *Africa, Archæology, Australia, Ethnology, Fire-making, Flint-finds, India, Maori, Physical Anthropology, Tuareg.*

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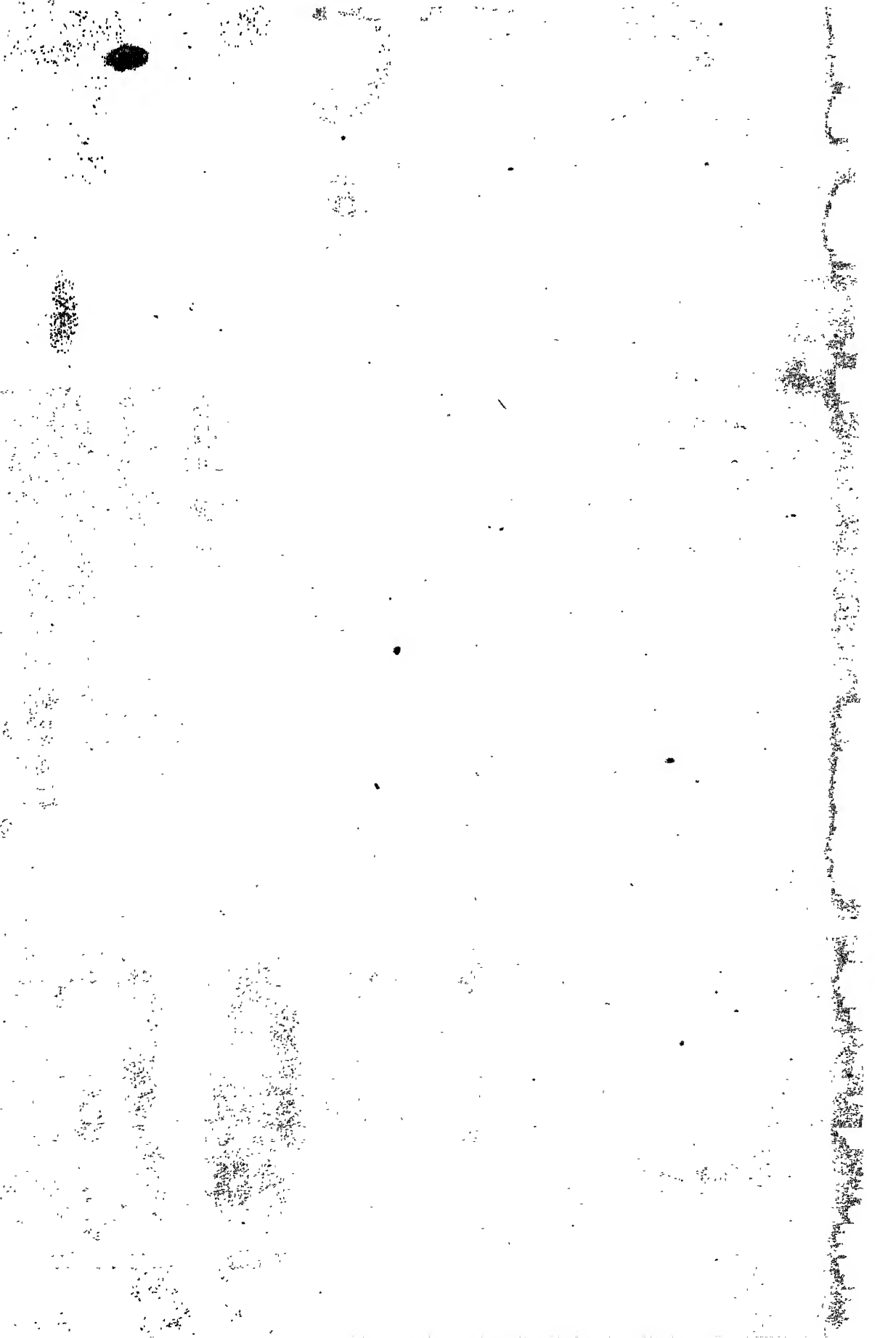
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